OIL MATIC

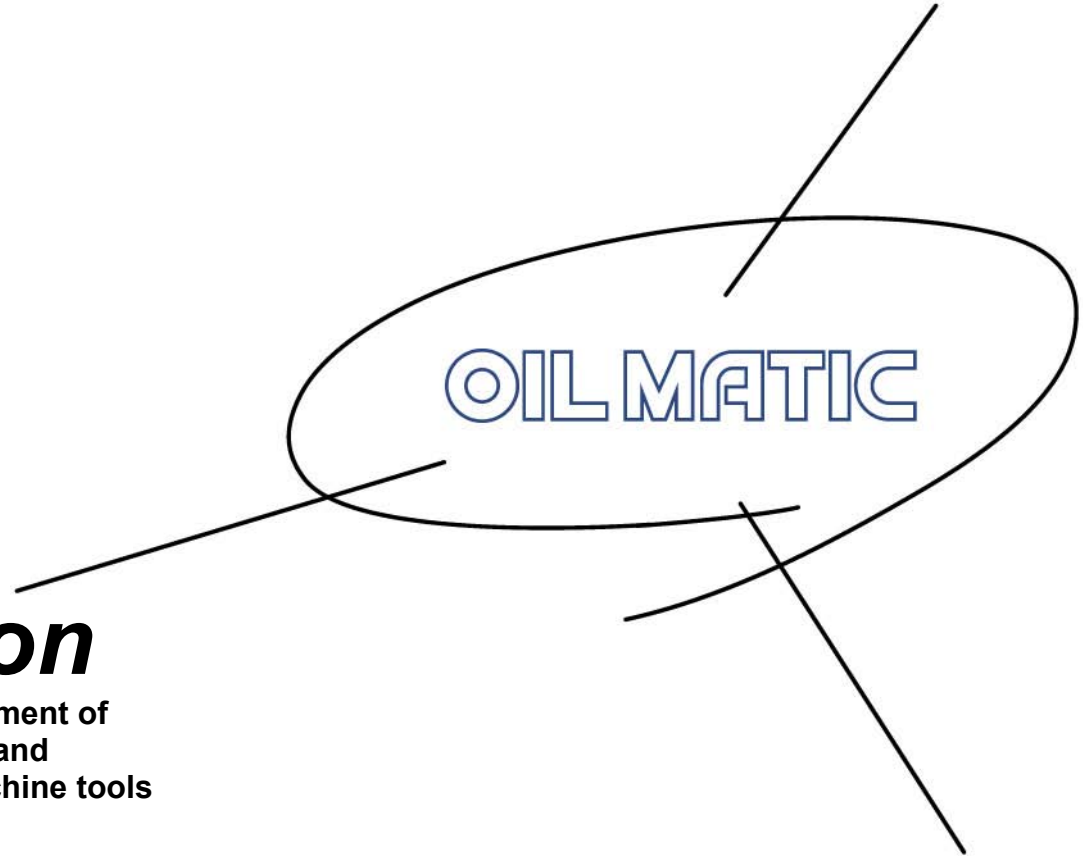
AUTOMATIC LIQUID TEMP. REGULATOR

Photograph provided by Kikuchi Seisakusho Co., Ltd.

Supporting manufacturing shop floor with advanced liquid temperature control technologies

Solution

Solves customers' needs



Mission

Supports development of higher-speed and higher-precision machine tools

Application

Responds to needs from a wide range of work fields

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“Pioneer spirit” × “Craftsmanship”

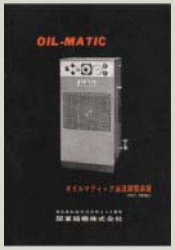
OIL MATIC

OIL MATIC is an automatic liquid temperature regulator that controls temperature of any liquid used in machine tools, semiconductor-manufacturing equipment and various industrial machines with high precision. By minimizing “heat problems,” represented by thermal displacement, with OIL MATIC designed and fabricated according to machine/equipment characteristics, we maximize the machine/equipment performance and enhance the added value of workpieces.

History

For suppressing thermal displacement

Year 1965, the birth year of OIL MATIC, was the year that Japan was enjoying rapid economic growth. Many manufacturing companies that supported an era of mass production and mass consumption were facing a challenge of controlling “heat” generated from machine tools, and improving precision of their workpieces. OIL MATIC was developed to solve this issue. Since the release of OIL MATIC, we have been working on every problem related to heat consistently from the standpoint of both “machine manufacturers” and “users.”



Brochure of the first OIL MATIC machine (1965)

Technology

Innovating technologies in response to the needs of the times

OIL MATIC realizes high precision machining of workpieces and always keeps machines/equipment under optimum operating conditions by controlling various kinds of coolant used in machine tools and industrial machines with “high precision” and “high responsiveness.” While hearing voices of OIL MATIC users and manufacturers of machine tools and industrial machines as well as sensitively recognizing the need of the times, we develop and improve products constantly in conscious of the next-generation accuracy and speed.

Development of OIL MATIC (around 1990)

Ecology

Responding to environmental issues toward further evolution

You can learn high environmental awareness reflected in OIL MATIC, such as from the “development of OIL MATIC with the industry’s first inverter control (1994)” and “complete shift from the use of chlorofluorocarbon to the use of new refrigerant (2000).” Under the ISO14001 Environmental Management System, we will strive hard to develop environment-friendly products that suit machine tools and industrial machines or so-called the “mother machines,” by “improving recyclability of components,” “saving oil and chlorofluorocarbon by downsizing machines,” “saving energy according to machine characteristics” and so on.

Brazing work

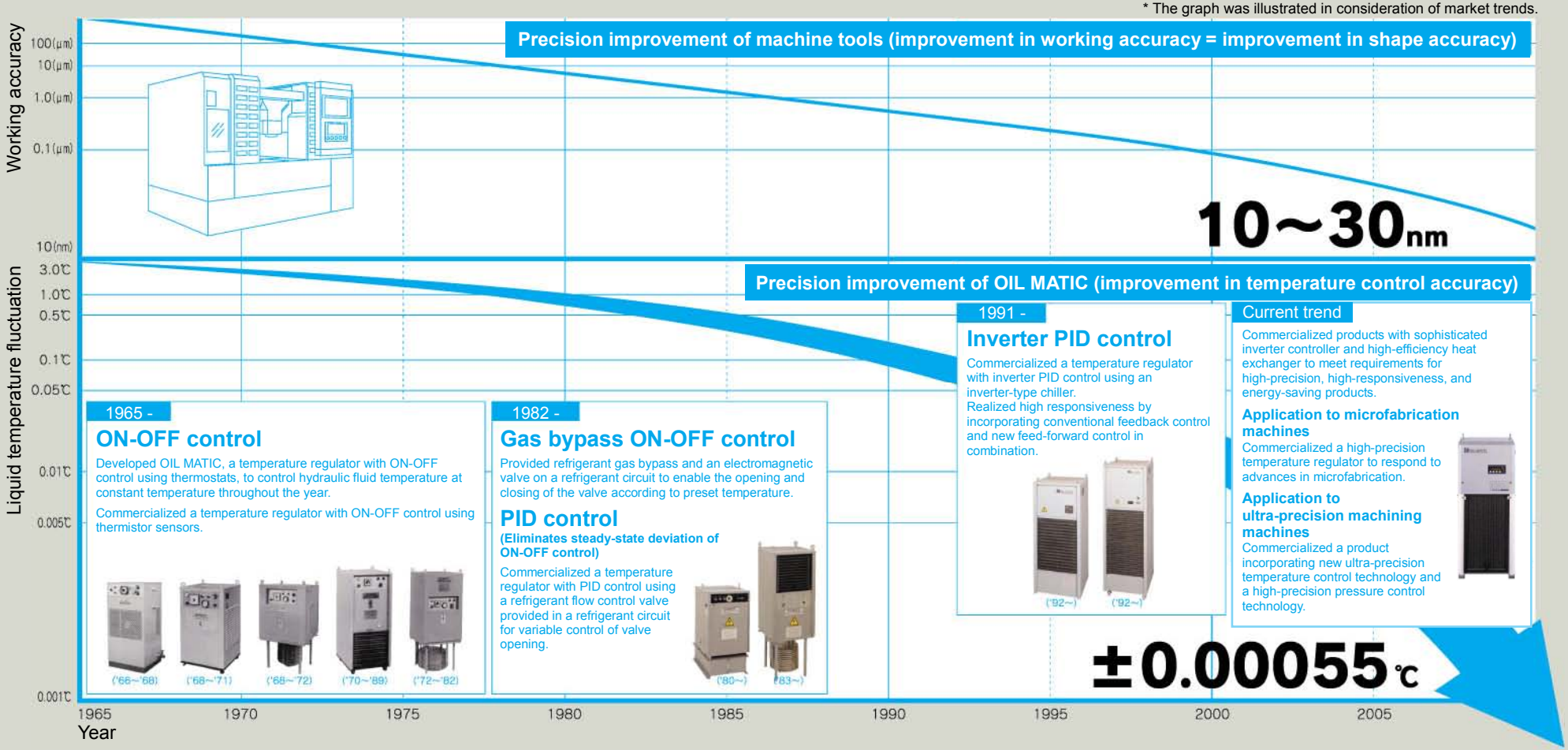
Mission

OIL MATIC mission

OIL MATIC promptly responds to the diverse needs of machine tools and industrial machines and keeps evolving.

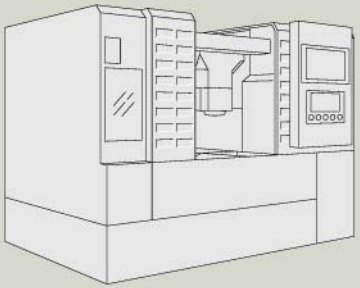
“Needs” × “Evolution” Customers’ needs and OIL MATIC’s evolution

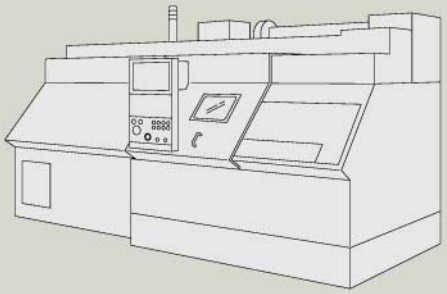
* The graph was illustrated in consideration of market trends.


Working accuracy
100(μm)
10(μm)
1.0(μm)
0.1(μm)
10(nm)
Liquid temperature fluctuation
3.0℃
1.0℃
0.5℃
0.1℃
0.05℃
0.01℃
0.005℃
0.001℃
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year
Precision improvement of machine tools (improvement in working accuracy = improvement in shape accuracy)
10~30nm
Precision improvement of OIL MATIC (improvement in temperature control accuracy)
±0.00055℃
1965 -
ON-OFF control
Developed OIL MATIC, a temperature regulator with ON-OFF control using thermostats, to control hydraulic fluid temperature at constant temperature throughout the year.
Commercialized a temperature regulator with ON-OFF control using thermistor sensors.
('66~'68)
('68~'71)
('68~'72)
('70~'89)
('72~'82)
1982 -
Gas bypass ON-OFF control
Provided refrigerant gas bypass and an electromagnetic valve on a refrigerant circuit to enable the opening and closing of the valve according to preset temperature.
PID control
(Eliminates steady-state deviation of ON-OFF control)
Commercialized a temperature regulator with PID control using a refrigerant flow control valve provided in a refrigerant circuit for variable control of valve opening.
('80~)
('83~)
1991 -
Inverter PID control
Commercialized a temperature regulator with inverter PID control using an inverter-type chiller.
Realized high responsiveness by incorporating conventional feedback control and new feed-forward control in combination.
('92~)
('92~)
Current trend
Commercialized products with sophisticated inverter controller and high-efficiency heat exchanger to meet requirements for high-precision, high-responsiveness, and energy-saving products.
Application to microfabrication machines
Commercialized a high-precision temperature regulator to respond to advances in microfabrication.
Application to ultra-precision machining machines
Commercialized a product incorporating new ultra-precision temperature control technology and a high-precision pressure control technology.

“Customers’ needs” × “Products”

Customers’ needs





×

OIL MATIC

SALES SECTION

Provides best proposals based on rich experience in fields

This section handles heat-related problems that machine tool manufacturers, semiconductor-manufacturing equipment manufacturers and industrial machine manufacturers, who are our major customers, as well as users of their machines are facing and proposes the best specifications for these customers. Sales representatives in each region responsibly respond to customers in their regions. Also, the sales representatives widely introduce the latest trend of liquid temperature control technologies and other information to customers through presentations, etc.

R&D DIVISION

A core division for high-level product development

This division forms development plans of control technologies for various temperature regulators, including OIL MATIC. Also, the division collects information on advanced technologies in collaboration with universities and research institutes to incorporate feedback into products.
As a data bank of our unique technologies, the section also conducts mutual self-verification of accumulated technologies and advanced technologies, including submission of paper to academic journals.

Operation under Quality Management System (**ISO9001**)

Solution

OIL MATIC solutions
OIL MATIC solves customers’ needs and wants with its accumulated technologies and know-how.

DESIGN & TECHNICAL SECTION

Applying design techniques focusing on customers beyond drawings

This section reflects customers' needs for accuracy range of temperature, control methods, etc. that were identified by the sales section, in drawings after verifying them mutually with the Product Development Office, and creates "specifications" tailored to individual customers.
Their several thousands of abundant specifications and knowledge obtained from accumulated know-how create best specifications for customers.

MANUFACTURING

Produces products with diverse specifications in short lead times

A huge number and variety of parts are used for temperature regulators such as diverse OIL MATIC models tailored to each customer. This section procures these parts according to a production plan by using a self-designed automatic ordering system and an inventory control system.
In terms of manufacturing, "technical cores" of fabrication work, such as "brazing work" of refrigerant pipes and liquid pipe laying work, are elaborately and certainly passed down through education given under the Quality Management System as well as through a variety of project activities to ensure high-quality manufacturing.

AFTER-SALES SERVICES

Handles from maintenance and part supply to quality improvement

Since temperature regulators are used for "production goods such as machine tools and industrial machines that are used for a long term," OIL MATIC is basically designed to allow replacement and repair of not only the stand-alone OIL MATIC machine but also its component.
In case of failures, our service department or our business partners play the role of clarifying causes and developing countermeasures as well as quantitatively controlling failure data.

and Environment Management System (**ISO14001**)

Features of OIL MATIC

- "6 kinds of numbers" -

±0.00055

In 2009, we successfully developed a high-precision liquid temperature regulator for ultra-precision machine tools. We confirmed temperature precision of ±0.00055°C in an environment with a room-temperature fluctuation of ±0.04°C (measurement time: 36 hours). (Patent pending)

2

We can design and fabricate an OIL MATIC model that independently performs "individual temperature control" of two different systems to cope with "plural heat-generating components" accompanying multi-axis machine tools with integrated functions.

70

We thoroughly reviewed internal components of OIL MATIC and promoted downsizing of "heat exchanger," etc. As a result, we succeeded in developing environmentally friendly products, including those with 70% (*) less oil usage maximum and better recyclability. (*With C2200)

120

The operating frequency of an inverter compressor in OIL MATIC is 120Hz maximum. So, even if heat load fluctuates from no load to maximum load according to the main spindle rotating speed, the cooling capacity can be widely changed.

480

A "twin-pulse valve" with 480-pulse resolution, which is incorporated in models with inverter PID control and those with gas bypass PID control, realizes high-precision liquid temperature control by fine-controlling the refrigerant flow, without performing ON-OFF control even in the case of small heat generation. (Patent pending)

∞

Since its release in 1965, we have been accumulating know-how to meet customers' consistent needs for "high speed and high precision," which leads OIL MATIC to have abundant specifications and a variety of products. OIL MATIC will keep on evolving with customers toward infinite possibilities.

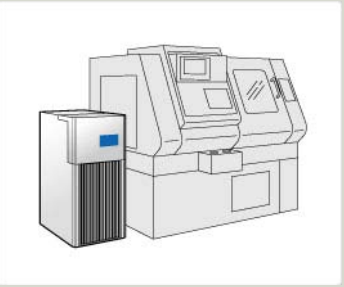
“Applications” × “Work fields”

Machining centers

Major heat-generating components are main bearings and main spindle drive motors (including built-in motors). OIL MATIC is used for “main spindle cooling,” which indirectly cools heat-generating components by flowing coolant into a coolant jacket (heat-exchanging part).
The “main spindle cooling” includes “jet lubrication” and “under-race lubrication” that lubricate and cool the main bearings in addition to “spindle core cooling,” which directly cools inside the main spindle. In any case, OIL MATIC is widely used.
Other than the above, OIL MATIC is used for “coolant cooling,” which controls and stabilizes cutting fluid temperature; “hollow ball screw cooling” for precision positioning drive; and “linear motor (DD motor) cooling,” “hydraulic fluid cooling,” and “machine body cooling” to suppress postural change of a machine body.

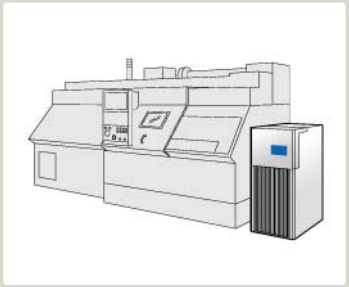
NC lathes

Major heat-generating components are a chuck head, which grips workpieces and tools, main bearings for turret and drive motors (including built-in motors). It is common to indirectly cool the heat-generating components by flowing coolant into a coolant jacket (heat exchanging part). Also, coolant cooling which controls and stabilizes cutting fluid temperature is needed. In any of the above cases, OIL MATIC is used.



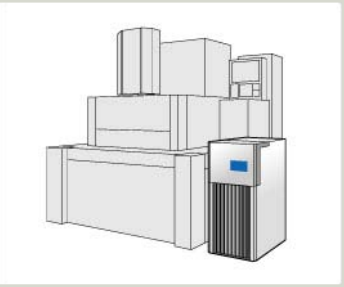
Combination machines

There are plural heat-generating components, such as a main spindle head (chuck head) and a sub spindle head for milling and a turret, in combination machines. In such cases, it is common to indirectly cool the heat-generating components by flowing coolant by using OIL MATIC, into plural coolant jackets (heat exchanging parts) provided for each of the heat-generating components.
OIL MATIC is also used such as for “coolant cooling” for stabilizing cutting fluid temperature, “hollow ball screw cooling” for precision positioning drive of multiple axes, “linear motor (DD drive motor) cooling,” “hydraulic fluid cooling,” and “machine body cooling” to suppress postural change of a machine body.



Electrical discharge machine

There are two types of electric discharge machines; a die-sinking Electric Discharge Machine (EDM) and a Wire Electric Discharge Machine (WEDM).
Each type uses OIL MATIC to cool machining fluid (oil or pure water) in a tank called a work tank, to achieve working accuracy.
OIL MATIC is also used for cooling liquid used in jet lines.



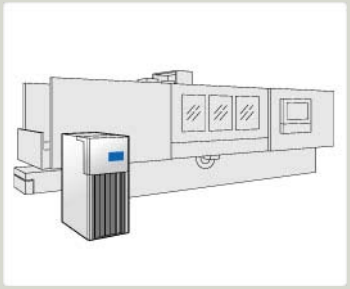
Application

OIL MATIC applications

OIL MATIC’s advanced liquid temperature control technologies respond to needs from diverse work fields. OIL MATIC contributes to stable system operation and improvement in quality and work efficiency.

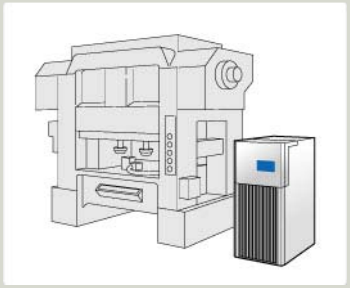
NC lathes

Major heat-generating components are a chuck head, which grips workpieces and tools, main bearings for grinding wheel spindle head and drive motors. It is common to “indirectly cool” the heat-generating components by flowing coolant into a coolant jacket (heat exchanging part).
Also, when using hydraulic hydrostatic bearings at a chuck head or a grinding wheel spindle head or when using a hydraulic hydrostatic guide for a table transport mechanism, OIL MATIC is essential for controlling the temperature of hydrostatic oil with high precision.
Other than the above, OIL MATIC is used such as for “coolant cooling” which controls and stabilizes cutting fluid temperature.



Press machines

For press machines (particularly, high-speed precision press machines), it is important to maintain accuracy of bottom dead center to achieve high working accuracy. Because of this, it is essential to cool “lubricant oil” used for the lubrication of sliding parts and bearings of cam-crank mechanism. In addition, there are many cases that machines are warmed up to promptly stabilize the machine body temperature at initial operation (start-up). In those cases, OIL MATIC is widely used.



Semiconductor manufacturing equipment

Components of semiconductor manufacturing equipment that require temperature control vary with manufacturing process. The following are major components that require temperature control.

Slicer..... : For cooling grinding wheel spindle head for slicing wafers and for cooling machining fluid (pure water)
Multi-wire saw ..... : For cooling multi-wire saw drive head for slicing wafers and for cooling machining fluid (slurry)
Grinder for wafers..... : For cooling grinding wheel spindle head for finishing of wafer surfaces and for cooling machining fluid
Polishing lathe, lap ..... : For cooling rotary table
Thin film manufacturing equipment
: For controlling temperature of plasma electrode chambers for PVD equipment, CVD equipment, dry etching equipment, etc.
Exposure equipment ..... : For controlling temperature of wafer drive stages and drive motors at ultra-precision
Prober ..... : For controlling temperature of fixed chuck for wafers
Dicer..... : For cooling grinding wheel spindle head for dicing wafers and for cooling machining fluid (pure water)
Laser dicer..... : For cooling laser oscillator
Tester ..... : For controlling temperature of fixed chuck for wafers

Physical, chemical and medical equipment

Case examples of temperature control in physical, chemical and medical equipment are as follows: For cooling tubes (X-ray oscillating sources) in X-ray analysis equipment and medical equipment, and for cooling laser oscillator in analysis equipment and medical equipment that use laser.

“Lineup” × “Customization”

Basic lineup of OIL MATIC models

Oil	Oil, soluble coolant and water		Water
Circulation (closed) type	Open type	Circulation (closed) type	Circulation (closed) type
Series C INVERTER	Series V INVERTER	Series MRCC INVERTER	Series W INVERTER
Series CL G/B PID	Series KTV ON / OFF	Series MLCC (KTCG) ON / OFF	
Series ML ON / OFF			

■ Inverter control method ■ Gas bypass PID control method □ ON-OFF control method *For details, please refer to “Comparison of liquid temperature control methods” on page 31.

Lineup

OIL MATIC product lineup

We offer diverse product lineup to meet every need from customers.

Custom-made according to application

- Application
- Required accuracy
- Liquid temperature control method
- Other customer needs

OIL MATIC can control temperature of various types of liquid, not limited to oil, for machine tools and industrial machines. We develop, design and manufacture products with exclusive specifications according to application, cooling spots and required accuracy.
We propose a product which reflects from liquid temperature control methods (which are the know-how of Kanto Seiki Co., Ltd.) and compressor capacity that we suggest, to voltage which is different according to destinations, compliance with various regulations and user-friendliness.
Please feel free to contact us for application examples and past records.

Order made

Custom-made OIL MATIC machines
We propose an OIL MATIC machine according to required accuracy of your machine tool or industrial machine and its usage environment.

OIL MATIC-series products classified by application <list>

Application	Liquid used*	Series name	Control method	Model 01	Model 03	Model 05	Model 07	Model 11	Model 15	Model 22	Model 38
For cooling main spindle For controlling operating oil temperature For controlling lubricant oil temperature For cooling ball screws For cooling linear motor / DD motor	Oil **Circulation (closed) type**	**Series C**	Inverter control		●		●		●	●	
		Series CL	Gas bypass PID control	●	●		●	●			
		Series ML	ON-OFF control		●	●	●				
			Gas bypass ON-OFF control					●	●	●	●
For controlling coolant temperature For cooling ball screws For cooling machine body For cooling linear motor / DD motor	Oil Water Coolant **Open type**	**Series V**	Inverter control		●		●		●	●	
		Series KTV	ON-OFF control	●	●	●	●				
			Gas bypass ON-OFF control					●	●	●	●
	Oil Coolant **Circulation (closed) type** (Disassembled cleaning of cooler is possible)	**Series MRCC**	Inverter control				●		●		
		Series MLCC (KTCG)	ON-OFF control			●	●		●		
For cooling main spindle For cooling ball screws For cooling laser oscillator For cooling linear motor / DD motor for semiconductor manufacturing equipment For physical and chemical equipment	Water **Circulation (closed) type**	**Series W**	Inverter control		●		●		●	●	
Various other special specifications	For controlling temperature of ultra-precision (microfabrication) machines: Ultra-precision-class liquid temperature control: ±0.001-0.05 (°C) · Ultra-precision temperature control of hydrostatic bearings and operating oil for guide · Ultra-precision temperature control of spindle head · Ultra-precision temperature control of machining fluid For temperature control of semiconductor manufacturing equipment: High-precision liquid temperature control within ±0.1-1.0 (°C), ultra-precision-class liquid temperature control within ±0.001-0.05(°C), multi-system temperature control · Cooling spindles of dicer, slicer, grinder, polishing lathe and controlling temperature of machining fluid · Cooling laser oscillator · Controlling temperature of stage and drive section in exposure equipment · Controlling plasma electrode temperature of etcher, PVD and CVD equipment · Controlling temperature of tester/prober chuck · Ultra-low cooling for various applications For controlling temperature of medical, physical and chemical equipment: For controlling printer temperature: For controlling temperature of washing equipment: For controlling temperature of molding machines and dies: For independent temperature control of multi-systems: For ultra-low cooling for various applications: - Cooling W-ray tube - Controlling printer roll temperature - Controlling temperature of pure water for washing, etc. - Automatic die temperature regulator (MOLDMATIC)										

* Please consult us for designing and fabrication of various products with special specifications (such as OEM specifications, special shape specifications, water-cooled condenser specifications, different voltage specifications, tropical treatment specifications and various safety-standard specifications) other than the above.
* There may be restrictions depending on component and viscosity of liquid to use. Please contact us for details.

About model codes

* We offer other models in addition to those shown below according to your specifications. Please contact us for details.

① ② ③ ④
※ ※ ※ – ※

① Series (model) name.....C: Forced circulation-type inverter PID control model
V: Forced vortex-type inverter PID control model
CL: Forced circulation-type gas bypass PID control model
W: Forced water circulation-type inverter PID control model
② Nominal chiller capacity .... 175 : 0.17 (kW)
300 : 0.3 (kW)
750 : 0.75 (kW)
1100 : 1.1 (kW)
1500 : 1.5 (kW)
2200 : 2.2 (kW)
③ Model change code.....A-Z
④ Tail number code .....Describes equipment and specifications
L: With tank
H: With heater, etc.

M ① ② ③ – ④ ⑤ – ⑥
M ※ ※ ※ – ※ ※ – ※

① Performance .....L: Standard
P: High precision
R: High precision and high responsiveness
② Application .....S: For cooling main spindle
H: For temperature control of operating oil
L: For temperature control of lubricant oil
③ Type.....A, C (without tank)
B, D (with tank)
④ Nominal chiller capacity ...03 : 0.3 (kW)
05 : 0.5 (kW)
07 : 0.75 (kW)
11 : 1.1 (kW)
15 : 1.5 (kW)
22 : 2.2 (kW)
38 : 3.75 (kW)
⑤ Model change code.....A-Z
⑥ Specification code of individual option
CE: Complying with CE marking
H: With initial warm-up heater
Others

KT ① – ② ③ – ④
KT ※ – ※ ※ – ※

① Heat exchanging method .C: Forced-circulation type
V: Forced vortex type
② Nominal chiller capacity ..300 : 0.17 (kW)
3 : 0.3 (kW)
5 : 0.5 (kW)
7.5 : 0.75 (kW)
11 : 1.1 (kW)
15 : 1.5 (kW)
22 : 2.2 (kW)
38 : 3.75 (kW)
③ Model change code .....A-Z
④ Specification code of individual option
CE: Complying with CE marking
H: With initial warm-up heater
Others

Water-cooled condenser specifications

About water-cooled condenser specifications

Each of the series (*) has a “water-cooled condenser type” model that radiates condensation heat not into air but into coolant water. This specification is effective for preventing room temperature rise in factories.
If you wish to adopt this specification, piping work for passing coolant water will be needed. Also, water quality may be partially restricted to prevent scale adhesion. (Please see page 38.)
For details, please contact our sales representatives.
* There are some specifications that we cannot implement.

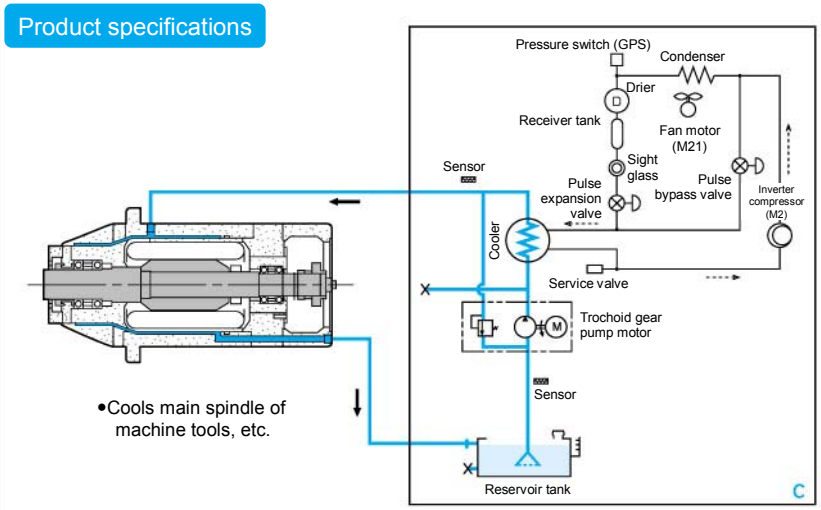
C750 (without tank)

A “standard” model supporting high precision of every machine tool

For temperature control of main spindle cooling oil, operating oil and hollow ball screws of machine tools, we have a lineup of three control methods according to accuracy. The series C and CL can control a wide range of liquid temperature by adopting Kanto Seiki’s unique technology called “twin-pulse valve control” (patented) for high-precision control of liquid temperature even in the case of small heat generation (low load), which makes them useful for microfabrication and high-precision finishing.

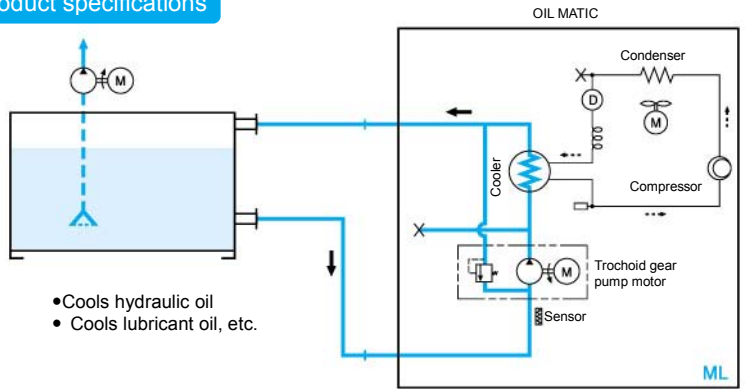
Cools main spindle | Cools operating oil | Cools lubricant oil | Cools linear motor | Cools ball screws | Cools machine body

Product specifications



•Cools main spindle of machine tools, etc.

Product specifications



•Cools hydraulic oil
• Cools lubricant oil, etc.

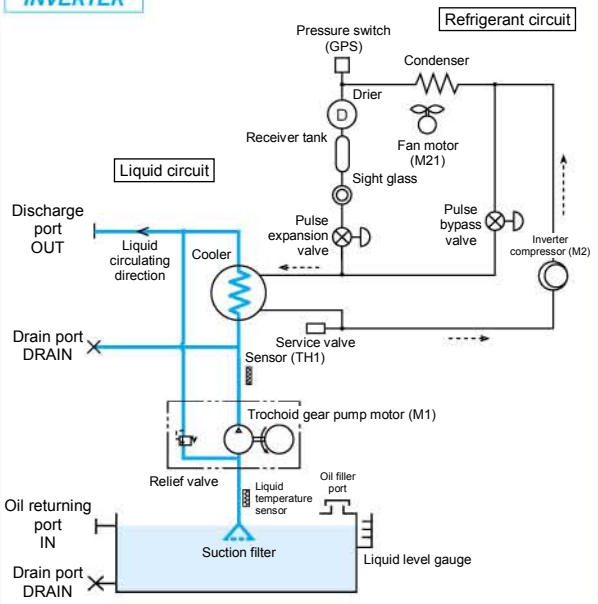
C/CL/ML Series

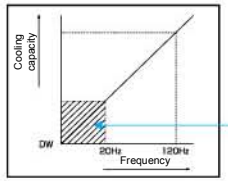
OIL MATIC series C, CL and ML Circulation (closed) type

OIL MATIC models for cooling main spindle, operating oil and lubricant oil

Series C INVERTER

Liquid and refrigerant circuit diagram



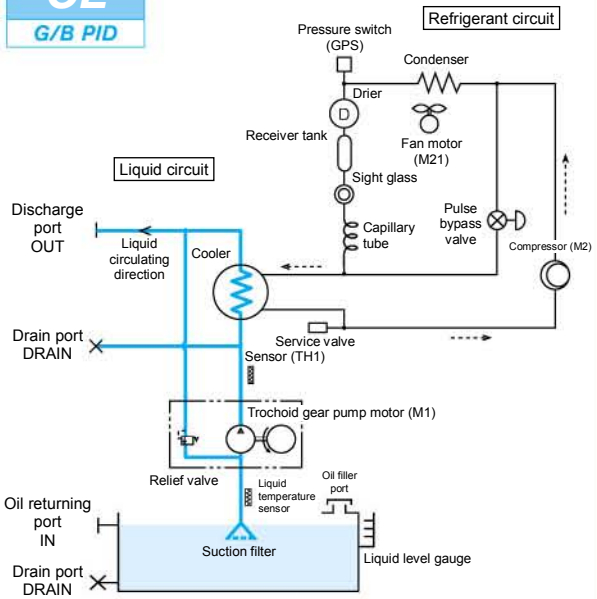


Control area of twin-pulse valve

The twin-pulse valve control enables a high-precision temperature control of ±0.1°C at low load and significant reduction in temperature setting time.

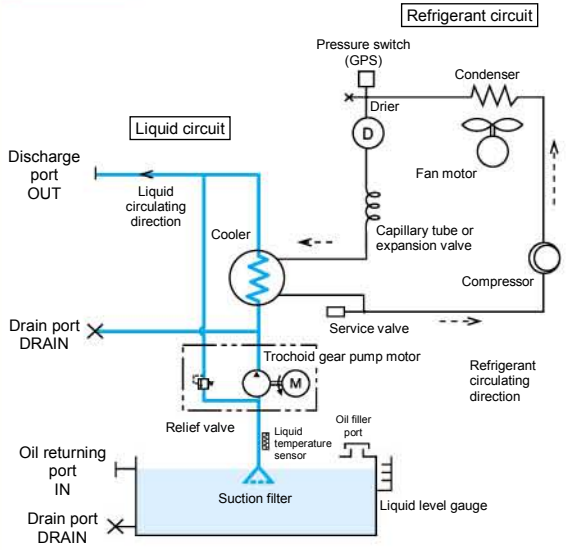
Series CL G/B PID

Liquid and refrigerant circuit diagram



Series ML ON / OFF

Liquid and refrigerant circuit diagram



Options implemented

- With reservoir tank
- With casters
- With heater
- Tropical (passing) treatment
- Water-cooled condenser specifications
- Specifications complying with various standards

* Please consult us for other special specifications. For details, please contact our sales representatives.

V300

An immersion-type OIL MATIC for coolant, etc.

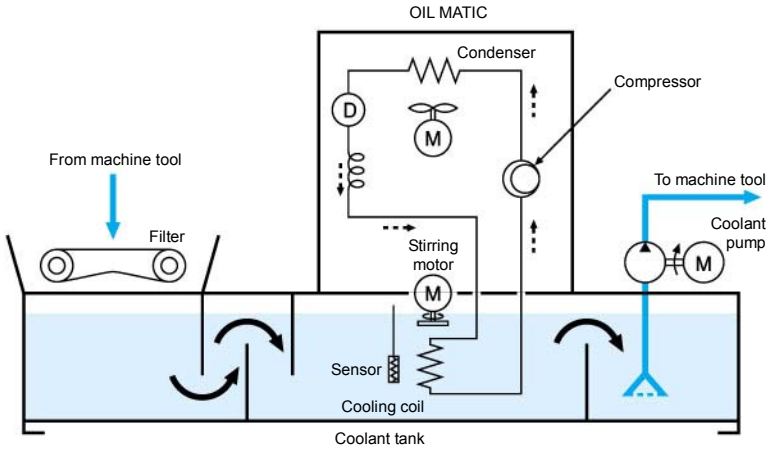
These models are developed with an idea of controlling temperature of coolant, etc. with high precision. The models exchange heat by immersing a cooling coil made of stainless steel into a tank.
We have a lineup of two control methods, an inverter control method and an ON-OFF control method. You can choose one according to your machining work and tank capacity.
The series V with the inverter control method can control a wide range of liquid temperature from low load to maximum heat load by implementing “twin-pulse valve control” (patented) technology that controls liquid temperature with high precision even in a low-load area.

Cools grinding fluid

Cools cutting fluid

Others

Product specifications



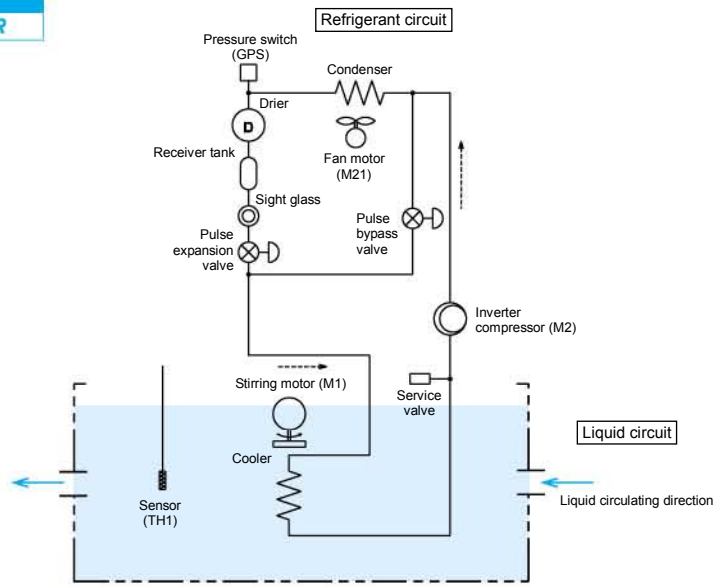
V/KTV Series

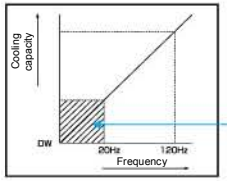
Series V/KTV of OIL MATIC Open type

OIL MATIC models for controlling temperature of liquid such as grinding fluid, cutting fluid and others for machine tools

Series V INVERTER

Liquid and refrigerant circuit diagram



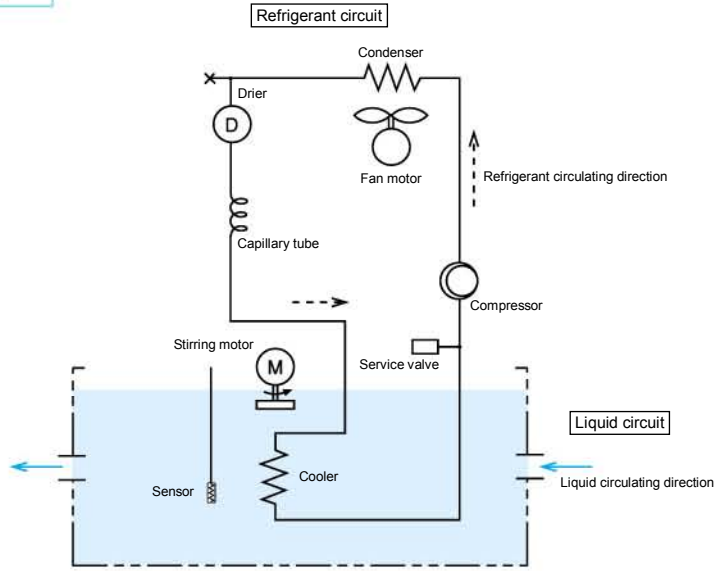


Control area of twin-pulse valve

The twin-pulse valve control enables a high-precision temperature control of ±0.1°C at low load and significant reduction in temperature setting time.

Series KTV ON / OFF

Liquid and refrigerant circuit diagram



Options implemented

With heater | Tropical (passing) treatment | Water-cooled condenser specifications | Specifications complying with various standards

* Please consult us for other special specifications. For details, please contact our sales representatives.

MRCC-07-N

Cools grinding fluid

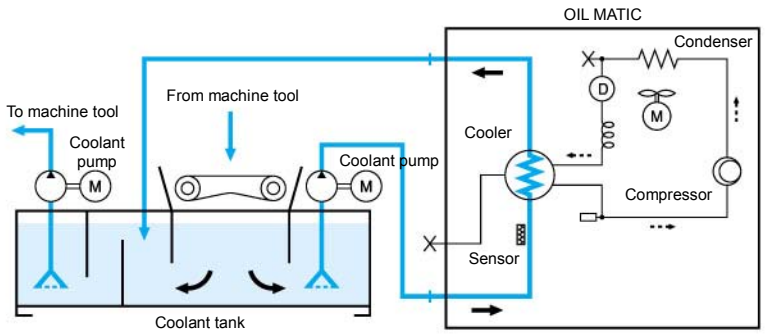
Cools cutting fluid

Others

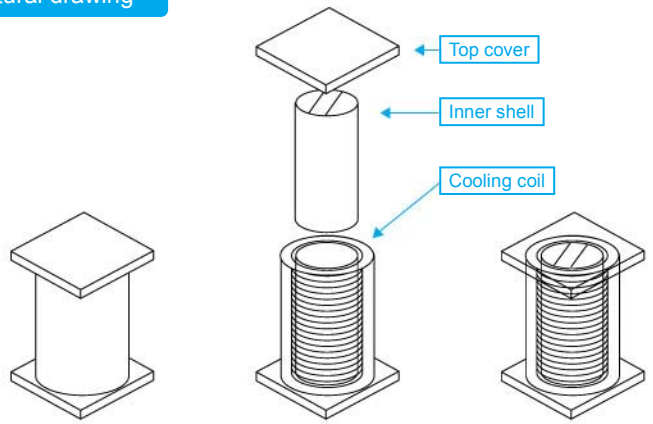
Maintaining stable cooling capacity with outstanding maintainability

These series are useful when a coolant tank is too low to immerse a coil into it. The coolant tank and OIL MATIC are connected using IN/OUT pipes and coolant is forcedly circulated to control temperature.
You can install these models to your existing coolant tank, or we can design and fabricate a model with “coolant pump function” for you.
The models have a structure that allows maintenance (such as cleaning off sludge adhering inside a cooling coil) of a cooler. So stable cooling capacity can be maintained over a long period of time by performing regular maintenance.
We have a lineup of two models; one with an inverter control method and the other with an ON-OFF control method. The series MRCC with inverter control method can control a wide range of liquid temperature by adopting “twin-pulse valve control” (patented) technology that controls liquid temperature with high precision even in a low-load area.

Product specifications



Structural drawing

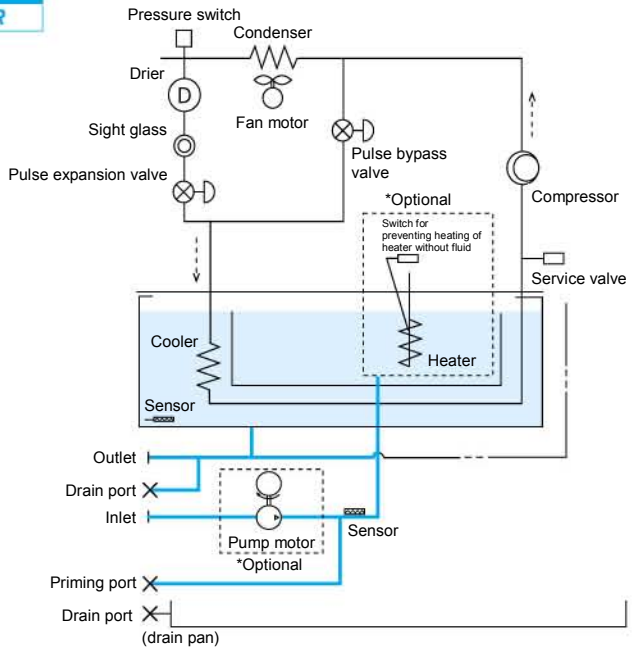


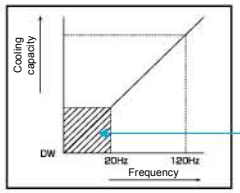
MRCC/MLCC(KTCG)Series

Series MRCC/MLCC (KTCG) of OIL MATIC
Circulation (closed) type
OIL MATIC models for controlling temperature of liquid such as grinding fluid, cutting fluid and others for machine tools

Series MRCC
INVERTER

Liquid and refrigerant circuit diagram



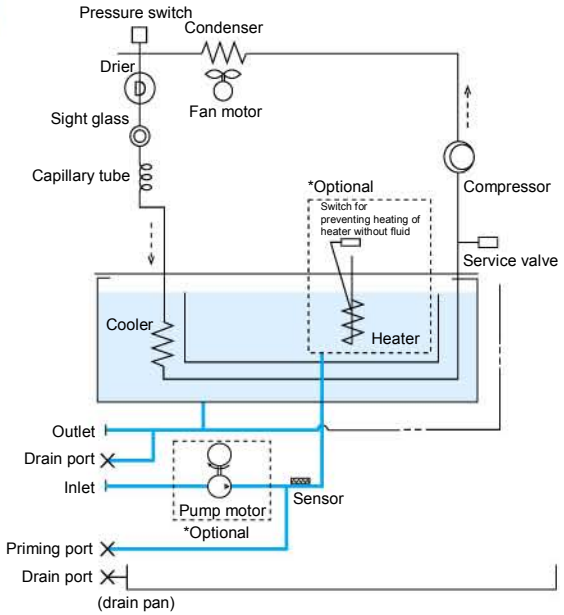


Control area of twin-pulse valve

The twin-pulse valve control enables high-precision temperature control of ±0.1°C at low load and significant reduction of temperature setting time.

Series MLCC (KTCG)
ON / OFF

Liquid and refrigerant circuit diagram



Options implemented

- With coolant pump
- With casters
- With heater
- Tropical band — Tropical (passing) treatment
- Water-cooled condenser specifications
- Standard-compliant — Specifications complying with various standards

* Please consult us for other special specifications. For details, please contact our sales representatives.

W300

Controlling a wide range of “water” temperature with high precision

These models adopting inverter control method are used for high-precision temperature control of “water” used by built-in motors and linear motors of main spindle head, semiconductor-manufacturing equipment and various industrial machines. While implementing the existing know-how accumulated through the development of OIL MATIC that handles a variety of cooling oils, the series W can control a wide range of liquid temperature from low load to maximum heat load by implementing “twin-pulse valve control” (patented) technology that controls liquid temperature with high precision even in a low-load area.

Semiconductor manufacturing equipment

Linear motor

Other various industrial machines

Model	W300	W750	W1500	W2200
Effective cooling capacity (W)	0-1800W	0-3700W	0-5800W	0-8000W
Nominal chiller capacity (W)	300	450	700	1100
Refrigerant used	R-407F			
Amount of refrigerant filled (g)	450	640	800	1000
Condenser	Forced air-cooled type parallel flow type			
Rated output of fan motor (W)	25	60	150	
Cooler (evaporator)	Plate-type heat exchanger (for water)			
Heating exchange method	Constant-flow forced circulation			
Solution-sending pump type	Immersion-type multistage pump			
Rated output of motor (W)	520	1040		
Flow rate (L/M) (50/60 Hz)	16L/min (24m/36m)	33L/min (44m/66m)		
Size of connected pipes (IN×OUT)	RC1/2×RC1/2			RC3/4×RC3/4
Reservoir tank capacity (L)	13	13	16	27
Power source	Motor circuit AC200V 50/60Hz, 220V 60Hz, 3-phase, control circuit DC24V DC15V DC5V			
Maximum operating current (A)	12	14	16	24
Normal operating current (A)	6	9	11	17
Temperature regulator	Digital inverter controller			
Setting range	Constant type (5-45°C), follow-up type (standard temperature: -9.9°C - +9.9°C)			
Range of surrounding temperature	5-45 (°C)			
Range of temperature control	5-45 (°C)			
Fluid to use	Water			
Appearance	Light gray / silver			
Dimensions (W×D×H (mm))	400×510×790	400×570×860	472×614×970	591×714×1055
Weight (kg)	70	90	100	140

* The operating current indicates normal operating current, not the maximum operating current.
* For effective cooling capacity, the maximum value within a range of use when oil complying with ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

Options implemented

- With heater
- Tropical band — Tropical (passing) treatment
- Water-cooled condenser specifications
- Standard-compliant — Specifications complying with various standards

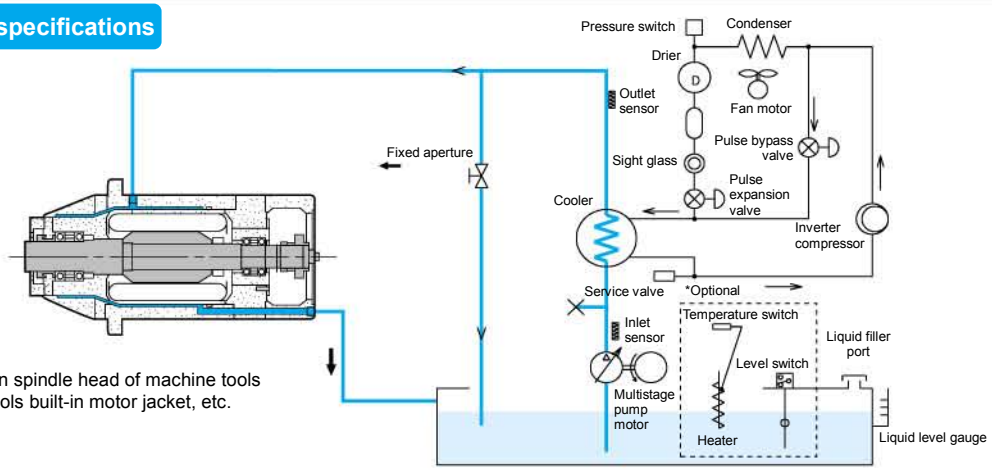
* Please consult us for other special specifications. For details, please contact our sales representatives.

*W*Series

Series W of OIL MATIC Circulation (closed) type

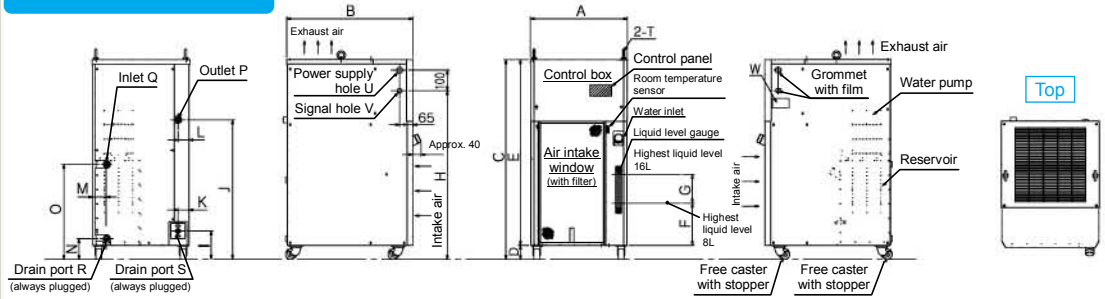
Water-type OIL MATIC models for semiconductor manufacturing equipment and industrial machines

Product specifications



•Main spindle head of machine tools
Cools built-in motor jacket, etc.

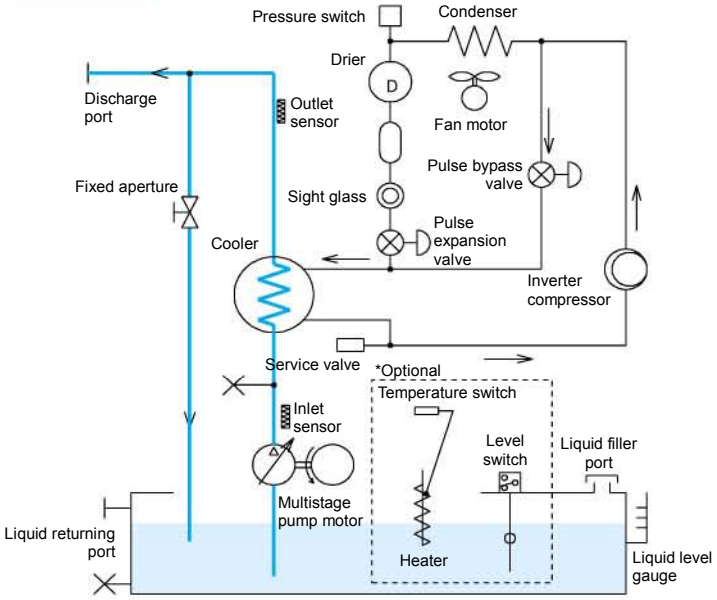
Dimensions

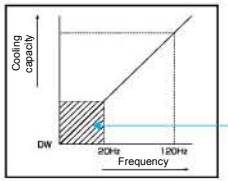


Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
W300	400	510	790	65	725	130	140	639	110	196	43	83	64	95	285	Rc 1/2 socket	Rc 1/2 socket	Rc 1/2 socket	Rc 3/8 socket	M12	Φ28	Φ22	Serial No. plate
W750	400	570	860	65	795	130	140	705	128	45	51	51	64	95	380	Rc 1/2 socket	Rc 1/2 socket	Rc 1/2 socket	Rc 3/8 socket	M12	Φ28	Φ22	Serial No. plate
W1500	472	614	970	68	902	205	140	819	138	678	54	53	65	101	461	Rc 1/2 socket	Rc 1/2 socket	Rc 1/2 socket	Rc 3/8 socket	M12	Φ28	Φ22	Serial No. plate
W2200	591	714	1055	68	987	245	140	904	138	734	59	53	60	105	458	Rc 3/4 socket	Rc 3/4 socket	Rc 3/4 socket	Rc 3/8 socket	M12	Φ28	Φ22	Serial No. plate

Series W INVERTER

Liquid and refrigerant circuit diagram





Control area of twin-pulse valve

The twin-pulse valve control enables a high-precision temperature control of ±0.1°C at low load and significant reduction in temperature setting time.

Specifications (series C and CL)

Series C specifications — Inverter control method

Model	C 300	C 750	C 500	C 2200
Effective cooling capacity (W)	0-2000W	0-4000W	0-6000W	0-8000W
Nominal chiller capacity (W)	300W or equivalent	750W or equivalent	1500W or equivalent	2200W or equivalent
Refrigerant used	R-407C			
Amount of refrigerant filled (g)	360	520	740	1120
Condenser	Forced air-cooled type parallel flow type			
Rated output of fan motor (W)	25	60	150	
Cooler (evaporator)	Plate-type heat exchanger			
Heating exchange method	Constant-flow forced circulation			
Solution-sending pump type	Trochoid gear pump			
Rated output of motor (W)	200	400	750	
Flow rate (L/M) (50/60Hz)	12/14.4	24/28.8	30/36	39/46.8
Total relief pressure (Mpa)	0.5			
Size of connected pipes (IN×OUT)	RC1/2×RC1/2	RC3/4×RC1/2	RC3/4×RC3/4	RC11/4×RC1
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase			
Maximum operating current (A)	9	11	14	22
Normal operating current (A)	7	8	11	19
Temperature regulator	Digital inverter PID controller			
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)			
Range of ambient temperature	5-45 (°C)			
Range of liquid temperature	5-45 (°C)			
Fluid to use	Mineral operating oil, lubricant oil, heat medium oil, etc.			
Appearance	Light gray, silver			
Dimensions (W×D×H (mm))	350×450×675	350×450×825	410×550×925	520×620×1015
Weight (kg)	60	75	95	135

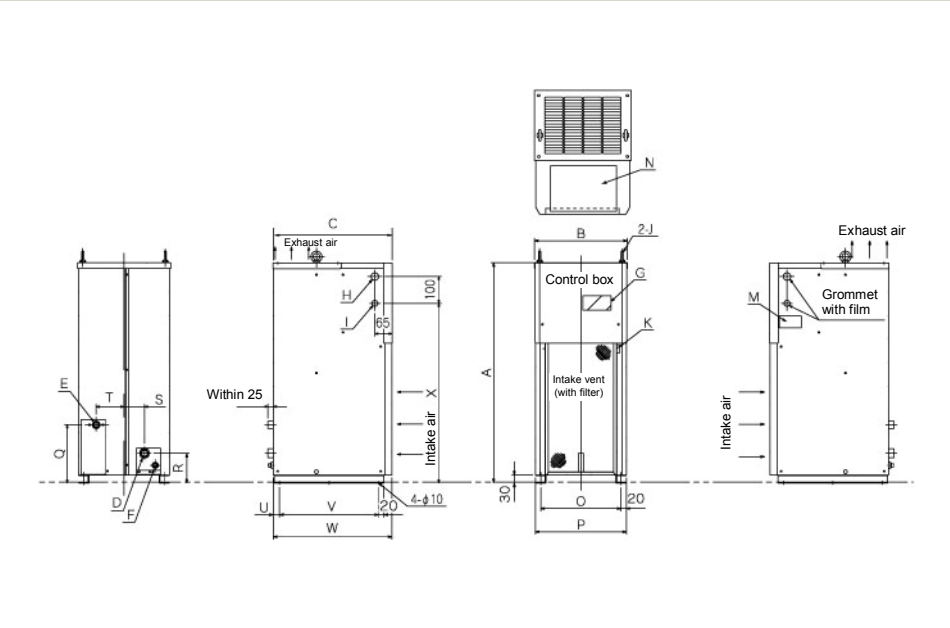
* The operating current indicates the normal operating current, not the maximum operating current.
* The effective cooling capacity indicates the maximum values within the range of use when oil ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

Series CL specifications — Gas bypass PID control method

Model	CL175	CL300	CL750	CL1100
Effective cooling capacity (W)(50/60Hz)	580/650	1160/1390	2800/2900	4000/4500
Nominal chiller capacity (W)	130W	300W	750W	1100W
Refrigerant used	R-134a	R-407C		
Amount of refrigerant filled (g)	280	420	560	700
Condenser	Forced air-cooled type parallel flow type			
Rated output of fan motor (W)	10	25	60	60/25
Cooler (evaporator)	Plate-type heat exchanger			
Heating exchange method	Constant-flow forced circulation			
Solution-sending pump type	Trochoid gear pump			
Rated output of motor (W)	200		400	
Flow rate (L/M) (50/60Hz)	6.0/7.2	12/14.4	24/28.8	
Total relief pressure (Mpa)	0.5			
Size of connected pipes (IN×OUT)	RC1/2×RC1/2		RC3/4×RC1/2	
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase			
Maximum operating current (A)	3	5	8	19
Normal operating current (A)	—	—	—	—
Temperature regulator	Digital PID controller			
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)			
Range of ambient temperature	5-45 (°C)			
Range of liquid temperature	5-45 (°C)			
Fluid to use	Mineral operating oil, lubricant oil, heat medium oil, etc.			
Appearance	Light gray			
Dimensions (W×D×H (mm))	300×508×485	350×450×675	350×450×825	400×470×880
Weight (kg)	40	60	75	80

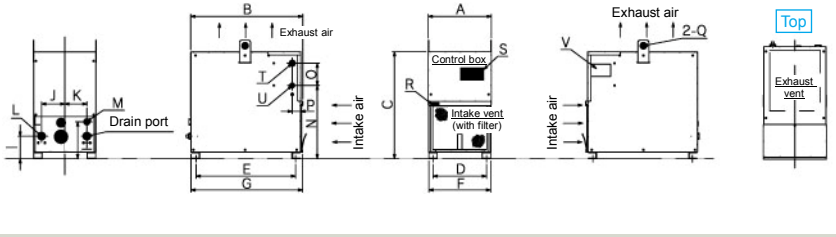
* The operating current indicates the normal operating current, not the maximum operating current.
* The effective cooling capacity indicates the maximum values within the range of use when oil ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

Series C dimensions

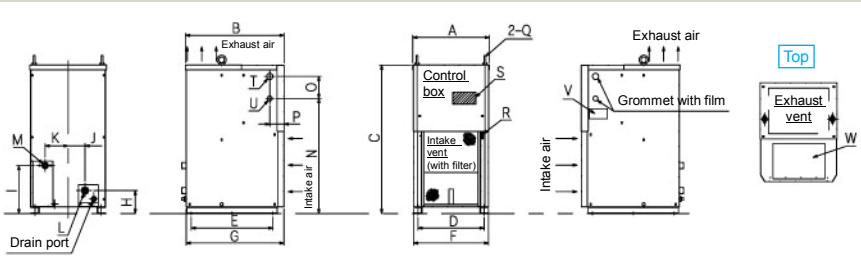


Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
C300	675	350	450	Rc 1/2	Rc 1/2	Rc 3/8	Control panel	Φ28	Φ22	M10 eyebolt	Room temperature sensor	Reference sensor	Serial No. plate	Caution plate	300	340	220	105	75	105	23	370	445	520
C750	825			Rc 3/4														110						670
C1500	925	410	550	Rc 3/4	Rc3/4					M12 eyebolt					360	400	240	130	85	135		470	545	770
C2200	1015	520	620	Rc11/4	Rc1					M16 eyebolt					475	515	270		115	185	21	522	615	860

Series CL dimensions



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
CL-175	300	508	485	242	451	280	506	165	100	105	100	Rc1/2	Rc1/2	330	100	38.6	Hanging hook	Room temperature sensor	Control panel	Φ28	Φ22	Serial No. plate



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
CL300	350	450	675	300	370	340	445	105	220	75	105	Rc1/2	Rc1/2	520	100	65	M10 eyebolt	Room temperature sensor	Control panel	Φ28	Φ22	Serial No. plate	Caution plate
CL750	350	450	825	300	370	340	445	110	220	75	105	Rc3/4	Rc1/2	670	100	65				Φ28	Φ22		
CL1100	400	470	880	350	390	388	435	110	220	100	130	Rc3/4	Rc1/2	728	100	65				Φ28	Φ22		

Specifications (series ML)

Series ML (without tank) specifications — ON-OFF control method

Model	MLSA-03 MLHA-03 MLLA-03	MLSA-05 MLHA-05 MLLA-05	MLSA-07 MLHA-07 MLLA-07	MLSA-11 MLHA-11 MLLA-11	MLSA-15 MLHA-15 MLLA-15	MLSA-22 MLHA-22 MLLA-22	MLSA-38 MLHA-38 MLLA-38
Effective cooling capacity (W) (50/60Hz)	1160/1390	1450/1740	2900/3480	3720/4460	4830/5810	7260/8720	12200/14650
Nominal chiller capacity (W)	300	500	750	1100	1500	2200	3750
Refrigerant used	R-407C						
Amount of refrigerant filled (g)	580	850	1000	1400	1670	2700	4200
Condenser	Forced air-cooled type cross-fin						
Rated output of fan motor (W)	25		60	60×2		85×2	
Cooler (evaporator)	Cylindrical multitubular type						
Heating exchange method	Constant-flow forced circulation						
Solution-sending pump type	Trochoid gear pump						
Rated output of motor (W)	200		400		750	750	1500
Flow rate (L/M) (50/60Hz)	12/14.4		24/28.8		30/36	39/46.8	58.5/70.2
Total relief pressure (Mpa)	0.5						
Size of connected pipes (IN×OUT)	RC1/2×RC1/2		RC3/4 ×RC1/2	RC3/4×RC3/4		RC11/4×RC1	
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase						
Maximum operating current (A)	3	5	7	10	15	22	35
Normal operating current (A)	—	—	—	—	—	—	—
Temperature regulator	Digital setting, indicated temperature controller						
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)						
Range of ambient temperature	5-45 (°C)						
Range of liquid temperature	5-45 (°C)						
Fluid to use	Mineral operating oil, lubricant oil, heat medium oil, etc.						
Appearance	Light gray						
Dimensions (W×D×H (mm))	360×420×815	360×420×915	390×440×944	435×520×1215	505×550×1250	605×575×1480	735×725×1740
Weight (kg)	50	70	70	110	120	185	300

* The effective cooling capacity indicates values when oil ISO VG32 or equivalent is used at the oil temperature and an ambient temperature of 35°C.
* Specifications are subject to change without notice for improvement.

Series ML (with tank) specifications — ON-OFF control method

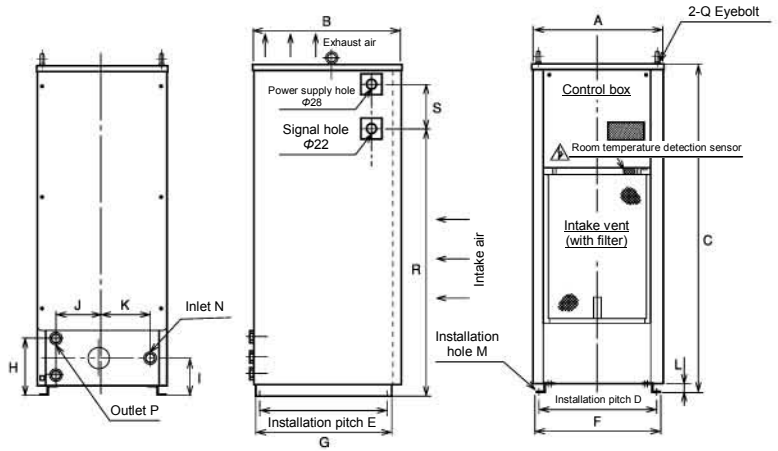
Model	MLSB-03	MLSB-05	MLSB-07	MLSB-11	MLSB-15	MLSB-22	MLSB-38
Effective cooling capacity (W) (50/60Hz)	1160/1390	1450/1740	2900/3480	3720/4460	4830/5810	7260/8720	12200/14650
Nominal chiller capacity (W)	300	500	750	1100	1500	2200	3750
Refrigerant used	R-407C						
Amount of refrigerant filled (g)	580	850	1000	1400	1670	2700	4200
Condenser	Forced air-cooled type cross-fin						
Rated output of fan motor (W)	25		60	60×2		85×2	
Cooler (evaporator)	Cylindrical multitubular type						
Heating exchange method	Constant-flow forced circulation						
Solution-sending pump type	Trochoid gear pump						
Rated output of motor (W)	200		400		750	750	1500
Flow rate (L/M) (50/60Hz)	12/14.4		24/28.8		30/36	39/46.8	58.5/70.2
Total relief pressure (Mpa)	0.5						
Size of connected pipes (IN×OUT)	RC1/2×RC1/2		RC3/4 ×RC1/2	RC3/4×RC3/4		RC11/4×RC1	
Reservoir tank capacity (L)	15		24	37		65	123
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase						
Maximum operating current (A)	3	5	7	10	15	22	35
Normal operating current (A)	—	—	—	—	—	—	—
Temperature regulator	Digital setting, indicated temperature controller						
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)						
Range of ambient temperature	5-45 (°C)						
Range of liquid temperature	5-45 (°C)						
Fluid to use	Mineral operating oil, lubricant oil, heat medium oil, etc.						
Appearance	Light gray						
Dimensions (W×D×H (mm))	360×420×815	360×420×915	390×440×944	435×520×1215	505×550×1250	605×575×1480	735×725×1740
Weight (kg)	70	80	90	135	150	275	400

* The effective cooling capacity indicates values when oil ISO VG32 or equivalent is used at the oil temperature and an ambient temperature of 35°C.
* Specifications are subject to change without notice for improvement.

Specification Specifications of OIL MATIC

Series MLSA, MLHA and MLLA (without tank) dimensions

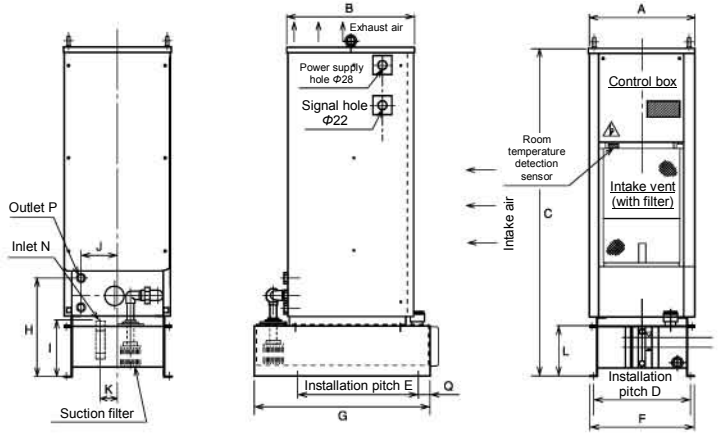
● ML＊A-03 ● ML＊A-05 ● ML＊A-07 ● ML＊A-11 ● ML＊A-15
● ML＊A-22 ● ML＊A-38



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S
ML＊A-03	360	420	815	320	350	344	382	160	100	130	130	30	4-φ10	RC1/2 Socket	RC1/2 Socket	M10	625	135
ML＊A-05	360	420	915	320	350	344	382	160	100	130	130	30	4-φ10	RC1/2 Socket	RC1/2 Socket	M10	725	135
ML＊A-07	390	440	974	350	380	374	403	170	110	148	143	30	4-φ10	RC3/4 Socket	RC3/4 Socket	M10	785	135
ML＊A-11	435	520	1215	380	440	418	470	190	125	110	160	40	4-φ12	RC3/4 Socket	RC3/4 Socket	M12	1025	135
ML＊A-15	505	550	1249	448	470	486	500	190	130	160	195	40	4-φ14	RC3/4 Socket	RC3/4 Socket	M12	1060	135
ML＊A-22	605	575	1480	546	500	584	530	225	130	200	215	40	4-φ14	RC11/4 Socket	RC1 Socket	4-M12	1265	135
ML＊A-38	725	725	1740	676	650	714	680	225	150	190	280	40	4-φ14	RC11/4 Socket	RC1 Socket	4-M12	1500	135

Series MLSB (with tank) dimensions

● MLSB-03 ● MLSB-05 ● MLSB-07 ● MLSB-11 ● MLSB-15
● MLSB-22 ● MLSB-38



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
MLSB-03	360	420	980	320	400	344	580	325	180	130	60	165	4-φ10	RC1/2 Socket	RC1/2 Socket	40
MLSB-05	360	420	1080	320	400	344	580	325	180	130	60	165	4-φ10	RC1/2 Socket	RC1/2 Socket	40
MLSB-07	390	440	1174	350	450	374	650	370	210	148	70	200	4-φ10	RC3/4 Socket	RC1/2 Socket	40
MLSB-11	435	520	1415	390	550	416	726	390	210	110	100	200	4-φ12	RC3/4 Socket	RC3/4 Socket	40
MLSB-15	505	550	1449	460	550	486	756	390	210	160	100	200	4-φ12	RC3/4 Socket	RC3/4 Socket	40
MLSB-22	605	575	1730	560	575	586	800	470	260	200	150	250	4-φ14	RC11/4 Socket	RC1 Socket	40
MLSB-38	735	725	1950	690	765	716	950	470	260	190	150	250	4-φ14	RC11/4 Socket	RC1 Socket	40

Specifications (series V and KTV)

Series V specifications — Inverter control method

Model	V 300	V 750	V 1500	V 2200
Effective cooling capacity (W)	0-1600	0-4000	0-6000	0-8000
Nominal chiller capacity (W)	300	450	700	1100
Refrigerant used	R-407C			
Amount of refrigerant filled (g)	460	620	780	1380
Condenser	Forced air-cooled type parallel flow type			
Rated output of fan motor (W)	25	60	150	
Cooler (evaporator)	Open coil			
Heating exchange method	Open-coil forced vortex type			
Stirring motor				
Rated output of motor (W)	50		100	
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase			
Maximum operating current (A)	8	9	12	20
Normal operating current (A)	6	8	12	18
Temperature regulator	Digital inverter PID controller			
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)			
Range of ambient temperature	5-45 (°C)			
Range of liquid temperature	5-45 (°C)			
Fluid to use	Coolant, water, etc.			
Appearance	Light gray, silver			
Dimensions (W×D×H (mm))	350×370×650	350×440×795	410×500×895	525×620×985
Weight (kg)	40	55	70	95

* The effective cooling capacity indicates the maximum values within the range of use when oil ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

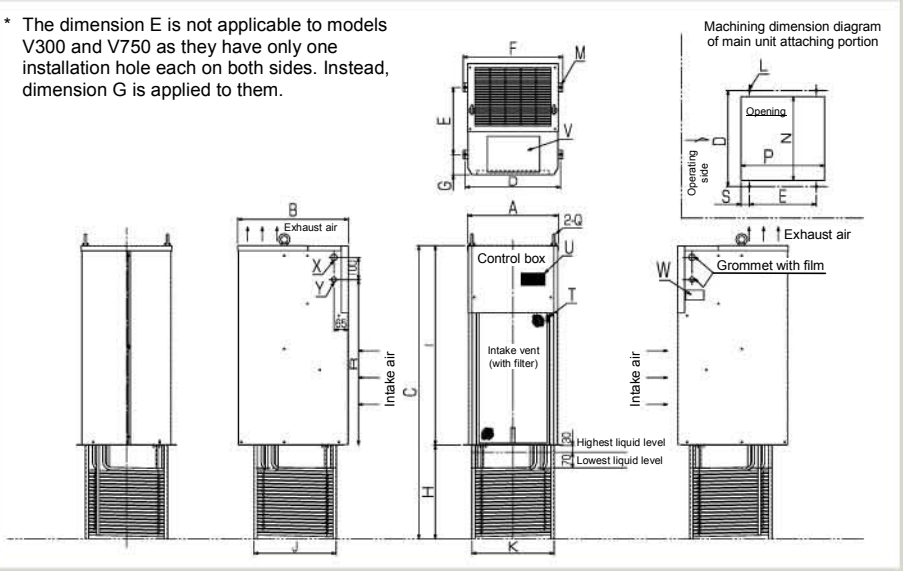
Series KTV specifications — ON-OFF control method

Model	KTV-3	KTV-5	KTV-7.5	KTV-11	KTV-15	KTV-22	KTV-38(Note)
Effective cooling capacity (W) (50/60Hz)	1160/1390	1450/1740	2900/3480	3720/4460	4830/5810	7260/8720	12200/14650
Nominal chiller capacity (W)	300	500	750	1100	1500	2200	3750
Refrigerant used	R-407C						
Amount of refrigerant filled (g)	800	900	900	1450	1900	3400	4500
Condenser	Forced air-cooled type cross-fin						
Rated output of fan motor (W)	25		60	60×2		85×2	85×2
Cooler (evaporator)	Open coil						
Heating exchange method	Open-coil forced vortex type						
Stirring motor							
Rated output of motor (W)	50		100				
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase						
Maximum operating current (A)	3	5	7	8	13	16	30
Normal operating current (A)	—	—	—	—	—	—	—
Temperature regulator	Digital setting, indicated temperature controller						
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)						
Range of ambient temperature	5-45 (°C)						
Range of liquid temperature	5-45 (°C)						
Fluid to use	Coolant, water, etc.						
Appearance	Light gray						
Dimensions (W×D×H (mm))	355×380×950	410×425×1130	475×500×1260	510×525×1360	545×565×1460	605×625×1615	735×725×1970
Weight (kg)	55	60	80	100	130	160	230

* The effective cooling capacity indicates values when oil ISO VG32 or equivalent is used at the oil temperature and an ambient temperature of 35°C.
* Specifications are subject to change without notice for improvement.
Note: The fluid to use for the model KTV-38 is limited. For details, please contact us.

Series V dimensions

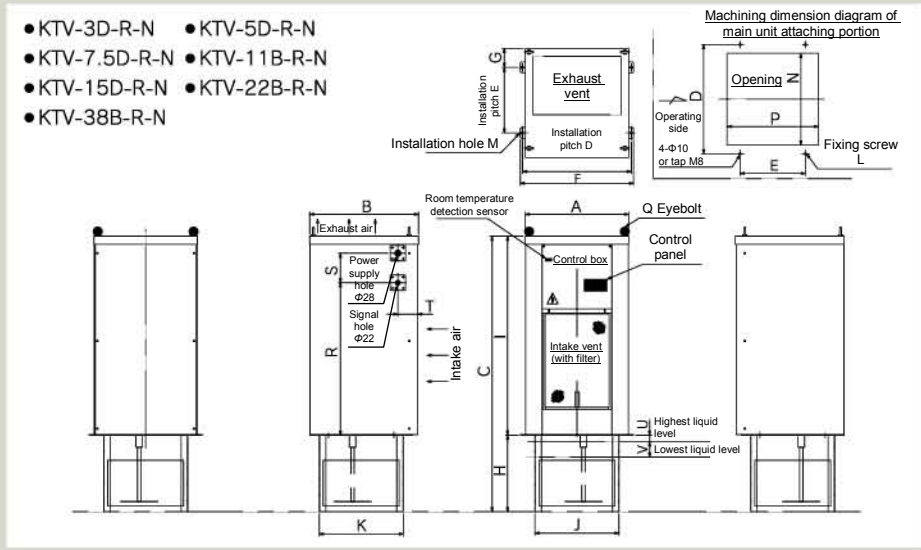
* The dimension E is not applicable to models V300 and V750 as they have only one installation hole each on both sides. Instead, dimension G is applied to them.



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y
V300	350	370	950	380	0	400	200	300	650	260	260	2-Φ10 or tap M8	2-φ10	280	280	M10 Eyenut	500	140	Room temperature sensor	Control panel	Caution plate	Serial No. plate	φ28	φ22
V750		440	1155		0		235	360	795	290	290			310	310		640	155						
V1500	410	500	1325	430	300	450	90	430	895	360	360		4-φ10	380	380	M12 Eyebolt	740	40						
V2200	525	620	1415	540	400	560	110		985	460	460			480	480	M16 Eyebolt	830	40						

Series KTV dimensions

- KTV-3D-R-N
- KTV-5D-R-N
- KTV-7.5D-R-N
- KTV-11B-R-N
- KTV-15D-R-N
- KTV-22B-R-N
- KTV-38B-R-N



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V
KTV-3	355	380	950	380	0	400	185	300	650	290	290	2-M 8	2-φ10	300	300	2-M10	460	135	90	30	70
KTV-5	410	425	1130	430	250	450	80	350	780	307	327	4-M 8	4-φ10	340	340	4-M10	575	135	100	30	70
KTV-7.5	475	500	1260	500	300	520	87	350	910	386	386	4-M 8	4-φ10	420	420	4-M10	700	135	90	30	70
KTV-11	510	525	1360	530	300	554	105	350	1010	460	460	4-M 8	4-φ10	470	470	4-M10	785	135	85	30	70
KTV-15	545	565	1460	590	340	614	105	420	1040	490	490	4-M 8	4-φ10	500	500	4-M10	825	135	85	30	70
KTV-22	605	625	1615	650	400	675	105	420	1195	550	550	4-M 8	4-φ10	560	560	4-M12	980	135	95	30	70
KTV-38	735	725	1970	780	500	810	105	520	1448	550	550	4-M 8	4-φ10	560	560	4-M12	1245	135	95	30	170

Specifications (series MRCC and MLCC)

Series MRCC specifications — Inverter control method

Model	MRCC-07	MRCC-15
Effective cooling capacity (W)	0-4000	0-6000
Nominal chiller capacity (W)	450	700
Refrigerant used	R-407C	
Amount of refrigerant filled (g)	1130	2150
Condenser	Forced air-cooled type cross-fin	
Rated output of fan motor (W)	60	
Cooler (evaporator)	Shell and tube	
Heating exchange method	Constant-flow forced circulation	
Size of connected pipes (IN×OUT)	RC3/4×RC3/4	
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase	
Maximum operating current (A)	8	12
Normal operating current (A)	—	9
Temperature regulator	Digital inverter controller	
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)	
Range of ambient temperature	5-45 (°C)	
Range of liquid temperature	5-45 (°C)	
Fluid to use	Coolant, etc.	
Appearance	Light gray	
Dimensions (W×D×H (mm))	440×625×1260	650×800×1420
Weight (kg)	110	180

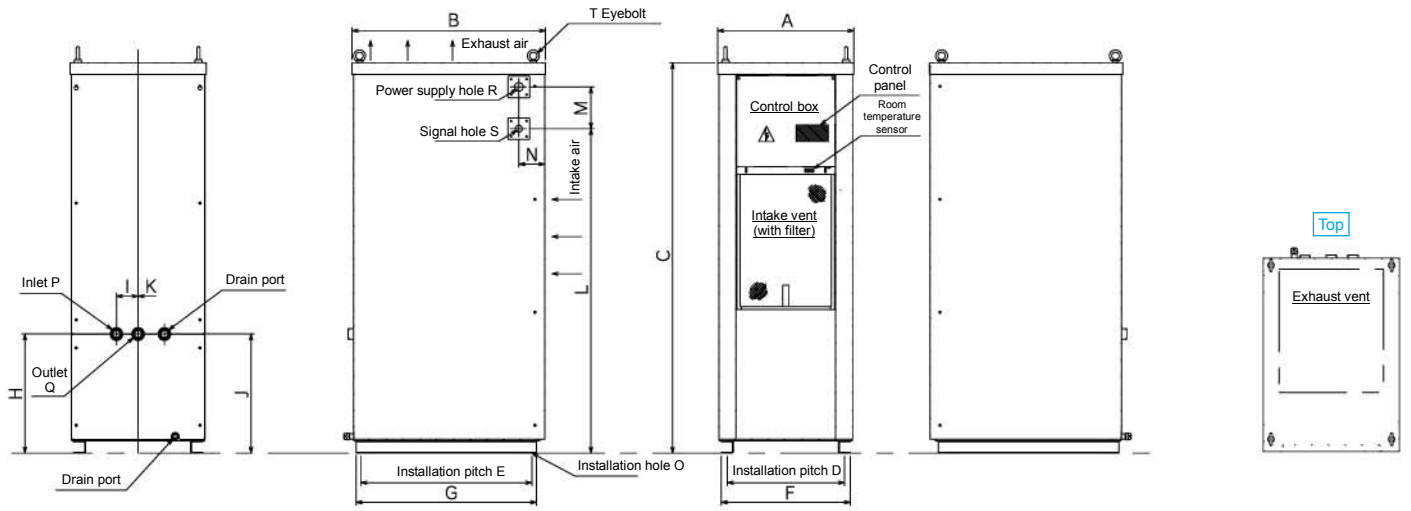
* The operating current indicates the normal operating current, not the maximum operating current.
* The effective cooling capacity indicates the maximum values within the range of use when oil ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

Series MLCC specifications — ON-OFF control method

Model	MLCC-05	MLCC-07	MLCC-15
Effective cooling capacity (W) (50/60Hz)	1450/1740	2900/3480	4830/5810
Nominal chiller capacity (W)	500	750	1500
Refrigerant used	R-407C		
Amount of refrigerant filled (g)	900	800	2200
Condenser	Forced air-cooled type cross-fin		
Rated output of fan motor (W)	45	60	
Cooler (evaporator)	Shell and tube		
Heating exchange method	Constant-flow forced circulation		
Size of connected pipes (IN×OUT)	RC3/4×RC3/4		
Power source	AC200V 50/60Hz, AC220V 60Hz, 3-phase		
Maximum operating current (A)	5		10
Normal operating current (A)	—		
Temperature regulator	Digital ON-OFF controller		
Setting range	Constant type (5-45°C), follow-up type (reference temperature: -9.9°C - +9.9°C)		
Range of ambient temperature	5-45 (°C)	5-40 (°C)	5-45 (°C)
Range of liquid temperature	5-45 (°C)		
Fluid to use	Coolant, etc.		
Appearance	Light gray		
Dimensions (W×D×H (mm))	410×625×1205	440×625×1260	650×800×1420
Weight (kg)	90	100	180

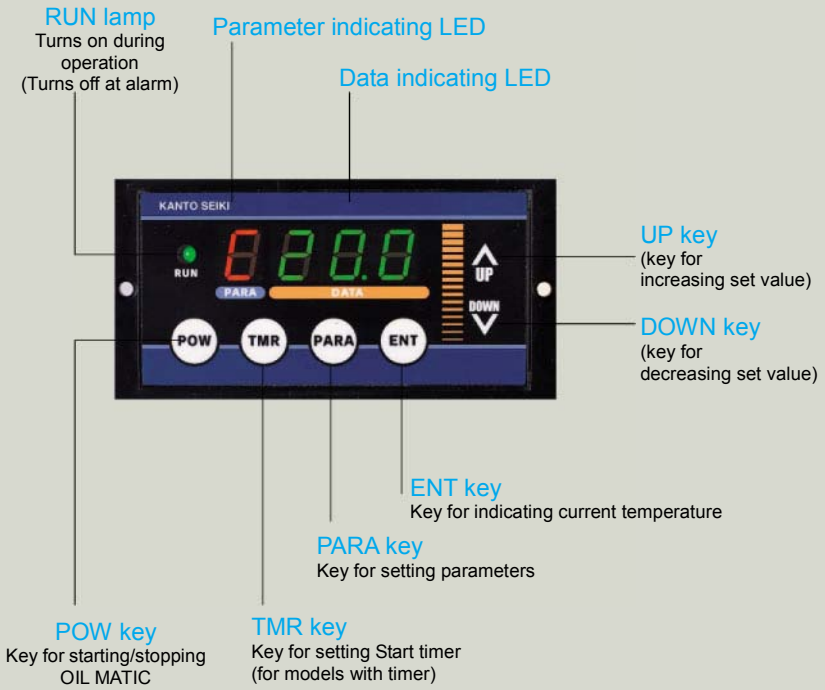
* The operating current indicates the normal operating current, not the maximum operating current.
* The effective cooling capacity indicates the maximum values within the range of use when oil ISO VG2 or equivalent is used.
* Specifications are subject to change without notice for improvement.

Series MRCC/MLCC dimensions



Size list	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
MRCC-07	400	625	1260	380	553	418	583	385	70	385	0	1045	135	85	4-14×20 Elongate hole	RC3/4 Socket	RC3/4 Socket	ϕ28	ϕ22	4-M10
MRCC-15	650	800	1420	585	355/355	625	740	230	163	140	163	1025	135	83	6-ϕ14	RC3/4 Socket	RC3/4 Socket	ϕ28	ϕ22	4-M12
MLCC-05	410	625	1205	348	553	386	583	135	70	205	0	985	135	95	4-14×20 Elongate hole	RC3/4 Socket	RC3/4 Socket	ϕ28	ϕ22	4-M10
MLCC-07	440	625	1260	380	553	418	583	385	70	385	0	1045	135	85	4-14×20 Elongate hole	RC3/4 Socket	RC3/4 Socket	ϕ28	ϕ22	4-M10
MLCC-15	650	800	1420	585	355/355	625	740	230	163	140	163	1025	135	83	6-ϕ14	RC3/4 Socket	RC3/4 Socket	ϕ28	ϕ22	4-M12

Controller (series C, CL, V and MR)



*The lights are being turned on for photographic purpose only, and the lighting may be different from the actual state.

High-precision temperature control at ±0.1°C (in stable heat-load state)

A unique temperature control technology responds to a wide range of heat load fluctuation from no load to maximum load. Variable control of cooling capacity allows high-precision temperature control.

A variety of alarm indication/output functions

The controller is provided with rich alarm indication/output functions, including equipment abnormality alarms (individual alarm indication and batch output) and temperature upper/lower limit alarm (setting, indication, and output)

Meeting various expansion needs

Not only simple monitoring, but also feed-forward control that enables highly responsive temperature control can be conducted by using a sophisticated two-way communication function. *The communication method is selectable from either serial communication (adopting RS-232C) or parallel communication (using input/output contacts of PLC, etc.). Various methods of alarm output are available.

Air filter cleaning sign

This is a warning sign that turns on after a certain period of operation to clean off an air filter, which is provided to prevent an air-cooled condenser from clogging, to prevent problems from occurring in a refrigeration cycle.

Equipped with useful Start timer function

OIL MATIC is equipped with the Start timer, which is useful for starting the equipment, that allows you to set the time at 0.1-h intervals up to a maximum of 99.9 h.

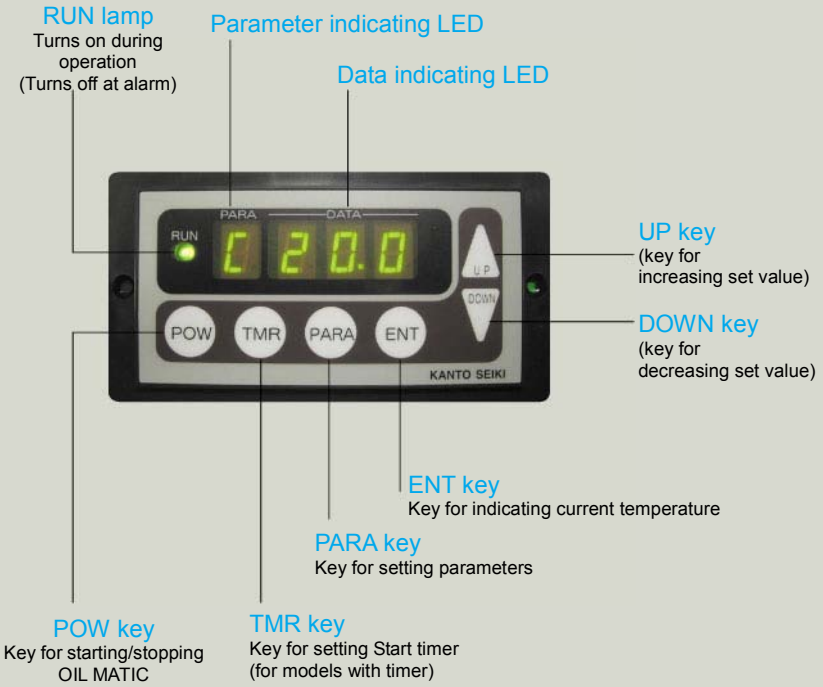
Auto-tuning function

In case OIL MATIC, which is installed in an actual machine, cannot control the temperature well, this auto-tuning function improves the control to a good state.

Selectable control modes

- Inverter PID, gas bypass PID, ON-OFF control
- Switchable between constant type (controls temperature to the preset temperature) and reference temperature follow-up type (controls temperature following the reference temperature)
- Switchable between sending (outlet) liquid temperature control and return (inlet) liquid temperature control
- Cascade control and control at use point are possible.

Controller (series ML and KTV)



*The lights are being turned on for photographic purpose only, and the lighting may be different from the actual state.

Digital temperature control

Temperature setting resolution:
Switchable between 1°C and 0.1°C
Range of temperature setting:
Constant type 5.0-45.0°C
Reference temperature follow-up type
-9.9 to +9.9°C

A variety of alarm indication/output functions

The controller is provided with rich alarm indication/output functions, including equipment abnormality alarms (individual alarm indication and batch output) and temperature upper/lower limit alarm (setting, indication, and output)

Useful Start timer function

OIL MATIC is equipped with the Start timer, which is used for starting the equipment, that allows you to set the time at 0.5-hour intervals up to 99.5 hours maximum.

Selectable control modes

Chiller ON-OFF control, Gas bypass ON-OFF control
Switchable between constant type (controls temperature to the preset temperature) and reference temperature follow-up type (controls temperature following the reference temperature)

Inverter control method

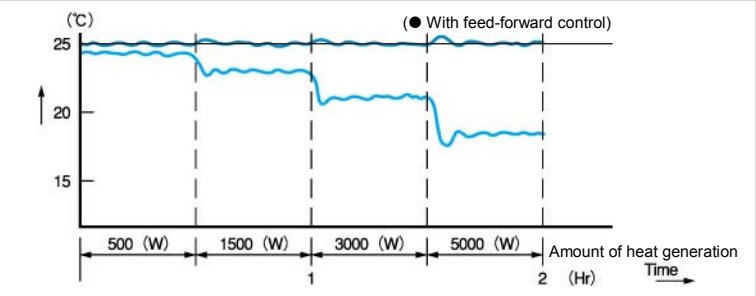
INVERTER

The inverter control is Kanto Seiki's unique control method (patented) that uses a combination of "variable frequency control" of inverter chiller, "refrigerant flow control" of pulse expansion valve, and "cooling capacity switching control" by gas bypass expansion valve. This method controls liquid temperature with high precision by linearly changing the cooling capacity according to the amount of heat generated by a machine to match the heat load even if the load fluctuates from low load to maximum load. With this method, a wide range of cooling capacity adjustment, etc., which was impossible with conventional inverter control, has become possible.

Series C, V, MR and W

- Microcomputer inverter control
- Return oil temperature control (accuracy: ±0.1-0.2°C)
- Without steady-state deviation of oil temperature

<Patent pending> Data example of controlled oil temperature <reference temperature 25°C>



Gas bypass PID control method

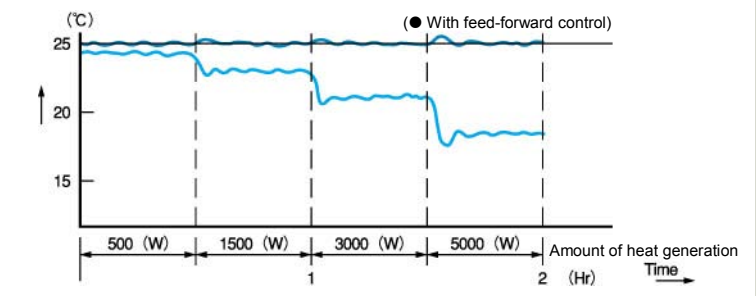
G/B PID

The gas bypass PID control is a non-inverter (patent pending) control method that controls liquid temperature with high precision within a wide range from low load to the maximum load by "variably controlling the cooling capacity with the bypass flow control of refrigerant hot gas" with use of a gas bypass pulse valve and linearly changing the cooling capacity according to the amount of heat generated by a machine to match the heat load.

Series CL

- Gas bypass PID control
- Return oil temperature control (accuracy: ±0.1-0.2°C)
- Without steady-state deviation of oil temperature

<Patent pending> Data example of controlled oil temperature <reference temperature 25°C>



ON-OFF control method

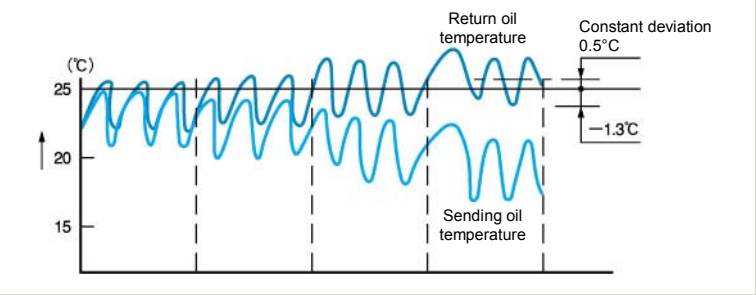
ON / OFF

The chiller ON-OFF (2-position) control is a method of controlling temperature by turning on or off a chiller according to the temperature deviation between the temperature detected by a liquid temperature sensor and the preset temperature. This method is often used since the control method and components are simple.

Series ML, KTV and KTC

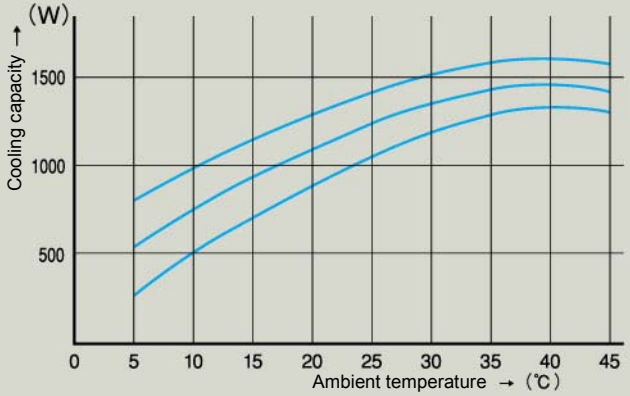
- Chiller ON-OFF control
- Return oil temperature control (accuracy: ±1.5-2°C)
- With steady-state deviation of oil temperature

Data example of controlled oil temperature <reference temperature 25°C>



Comparison of liquid temperature control methods

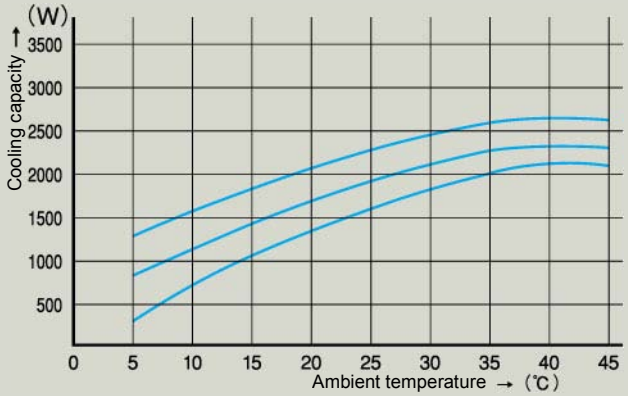
● -03 (CL300) cooling capacity diagram



Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

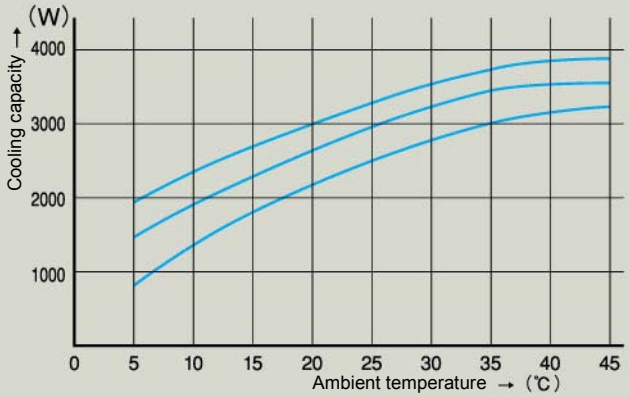
● -05 cooling capacity diagram



Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

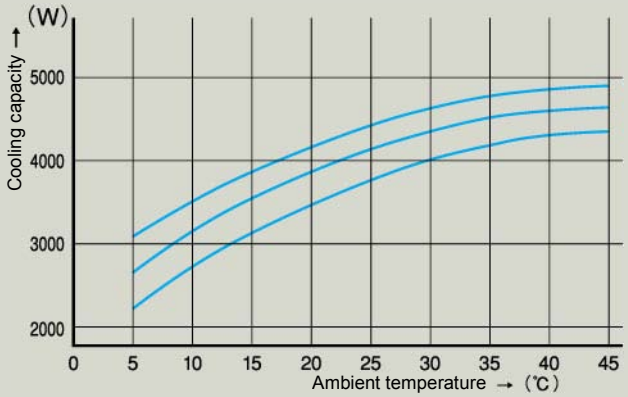
● -07 (CL750) cooling capacity diagram



Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

● -11 (CL1100) cooling capacity diagram

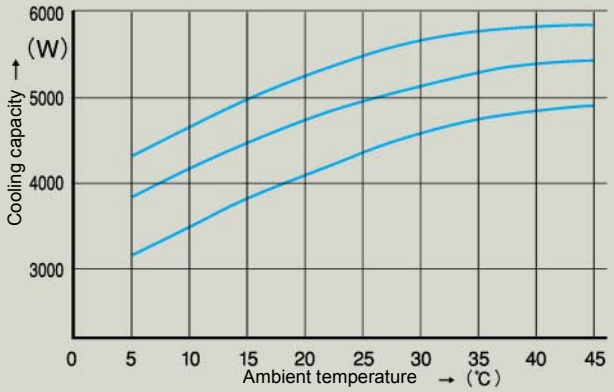


Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

Cooling capacity diagrams (series CL, ML, KTV and KTC)

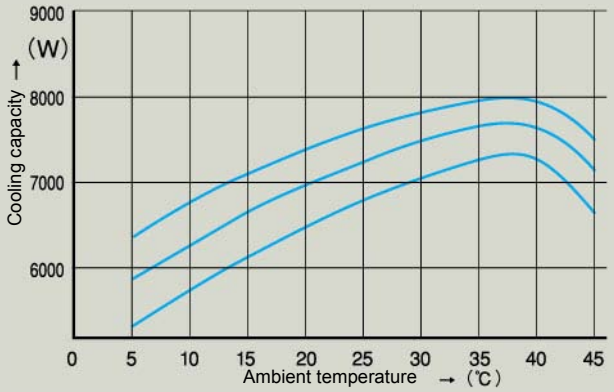
● -15 cooling capacity diagram



Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

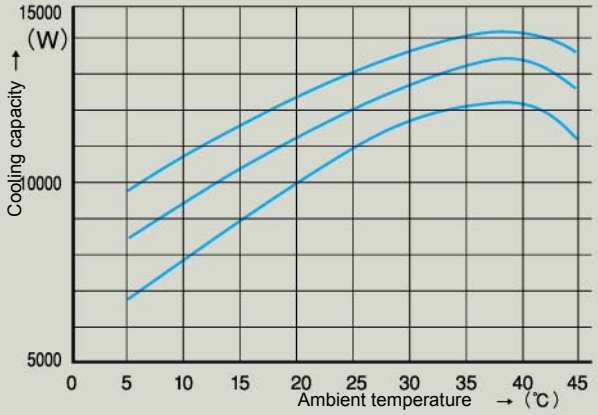
● -22 cooling capacity diagram



Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

● -38 cooling capacity diagram

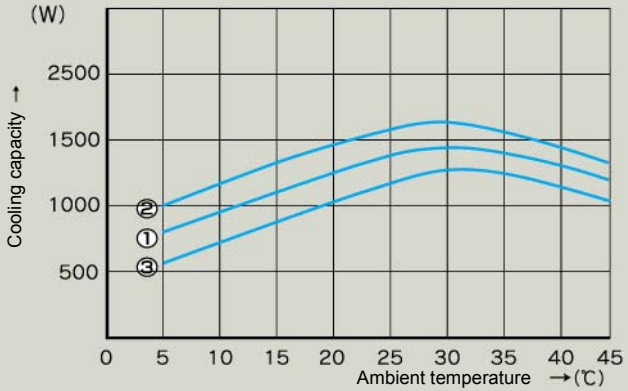


Oil temperature
= Ambient temperature + 5°C
Oil temperature
= Ambient temperature
Oil temperature
= Ambient temperature – 5°C

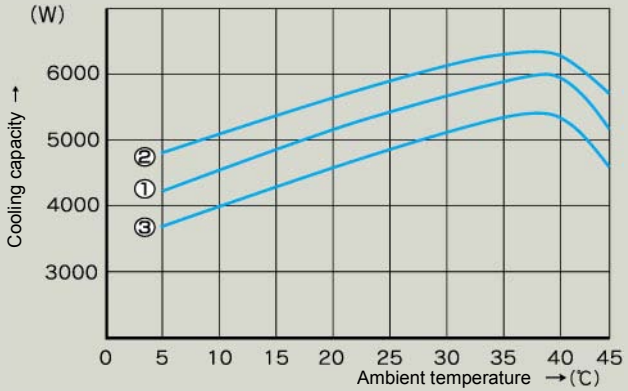
● Operating conditions
· Oil to use: ····· VG2
· Power frequency: ···· 50Hz
· Oil temperature:
····· Return oil temperature

Cooling capacity diagrams (series CL, ML, KTV and KTC)

- - 03 cooling capacity diagram
- -300 cooling capacity diagram



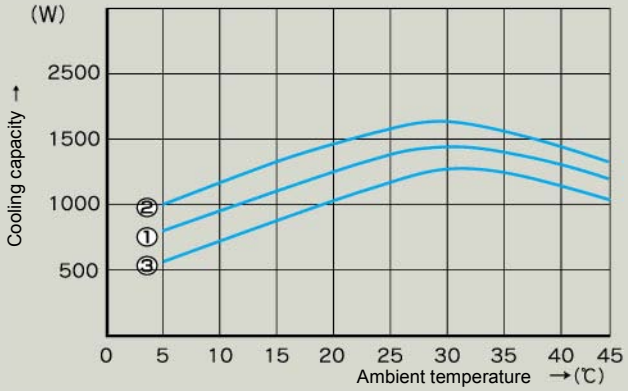
- - 07 cooling capacity diagram
- -750 cooling capacity diagram



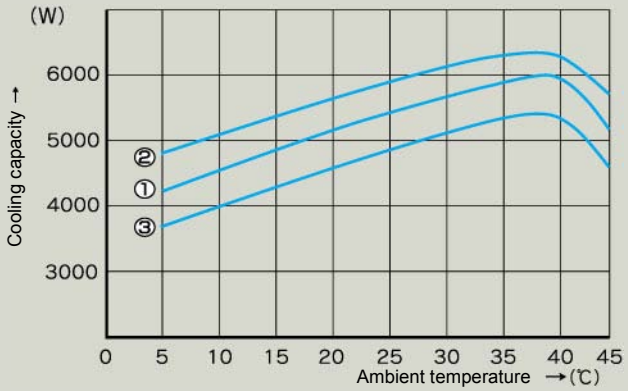
② Oil temperature
= Ambient temperature + 5°C
① Oil temperature
= Ambient temperature
③ Oil temperature
= Ambient temperature – 5°C

- Operating conditions
  - Oil to use: ····· VG2
  - Power frequency: ···· 50Hz
  - Oil temperature:
    ·····Return oil temperature

- - 15 cooling capacity diagram
- -1500 cooling capacity diagram



- -22 cooling capacity diagram
- -2200 cooling capacity diagram



Cooling capacity diagrams Inverter models (series C, V, MR and W)

■ For selecting a model, please contact us after you fill out the following OIL MATIC selection survey form.

● OIL MATIC selection survey form

Machine name	
Liquid name	Liquid manufacturer
Liquid type (operating oil, cutting oil, lubricant oil, etc.)	
Total capacity of fluid (or tank capacity)	m^3

Liquid's physical properties	Density* kg/m^3
Specific heat* J/kg·°C	Viscosity at 40°C* mm^2/s

	Pump type	Motor output	Discharge pressure	Discharge rate
1		KW	MPa	L/min
	Rotative power of spindle*			
				KW

If the machine uses cutting oil, grinding oil, and/or lubricant oil, then please be sure to fill in the columns marked with "*."

● Temperature increase measurement

Time	Liquid temperature (in tank)	Room temperature
0 min		
10 min		
20 min		
30 min		
40 min		
50 min		
60 min		
2 hrs		
3 hrs		
4 hrs		
5 hrs		
6 hrs		
7 hrs		
8 hrs		

Cautions

(1) Please start operation from a state that the liquid temperature and the room temperature are the same as much as possible, and measure average liquid temperature in the tank. The time indicates the time elapsed from the start of operation.

(2) Please operate the machine in a maximum heat-generating state.

(3) Please continue the measurement until the difference between the liquid temperature and the room temperature becomes constant.

(4) If because of too large heat generation (or extremely poor heat dissipation), you cannot continue the measurement until the difference between the liquid temperature and the room temperature becomes constant, then please continue the measurement up to as high temperature as possible.

(5) If cooling is conducted using a water tube provided inside the tank to cope with large heat generation, then please measure the temperature without running water (which uses a water cooler, etc.) as much as possible. Then, after releasing water to make the liquid temperature constant, please measure the liquid temperature, water flow rate, and temperature at the water inlet and outlet at that moment.

Coolant flow rate	L/min	Liquid temperature	°C
Coolant inlet temperature	°C	Coolant outlet temperature	°C

Values for deciding required cooling capacity

Desired liquid temperature °C	Annual maximum room temperature at machine installation site °C

● Estimated calculation of the amount of heat generated by main spindle

If you need estimated calculation of the amount of heat generated by main spindle, then please contact us with the following information:

- ♦ Type of machine tool
- ♦ Capacity of main spindle motor (continuous output / 30-minute rated output)
- ♦ Maximum number of rotation of main spindle
- ♦ Type and model (manufacturer) of bearing, quantity used, precompression, and load of bearing
- ♦ Bearing lubrication (grease lubrication, etc.) method and cooling (jacket cooling, etc.) method
- ♦ Type of lubricant (or cooling) oil

■ Precautions for transporting and moving OIL MATIC

(1) When moving OIL MATIC using its hanging hooks, take a reliable method to keep the main unit balance stable during movement.
(2) When using a forklift to move OIL MATIC in such a case that the main unit is heavy or difficult to be lifted using the hooks, pay due attention to safety and insert forklift forks deeply under the main unit until they come out of it to move the machine in stable condition.
(3) When moving OIL MATIC equipped with casters, check the floor conditions in the direction of movement while moving the machine and pay due attention to safety to prevent the machine from falling.

■ Precautions for power supply

(1) Connection of primary power wires and signal wires shall be performed by qualified personnel.
(2) For primary power wires and signal wires, use the wiring materials that can be used at the voltage and current specified in the specifications.
(3) Make sure to connect protective ground wires to the primary power wires.
(4) Connect the primary power wires after confirming that electricity is turned off.
(5) If OIL MATIC is not equipped with a breaker, then provide a power supply breaker with adequate power capacity to the machine.
(6) Turn off the power when not operating OIL MATIC for a long time.
(7) If power wires are connected in reverse phase, then a reverse-phase protection relay is activated so that OIL MATIC will not start. In this case, make sure that the primary power supply is turned off and replace the two power wires with each other.
(8) In case of emergency stop, make sure to turn off the primary power supply.

■ Precautions for installation environment

Do not install OIL MATIC in dusty environment or environment subject to frequent mist of liquids such as coolant and water droplets.

■ Precautions for operation, maintenance, and inspection

(1) Do not clean OIL MATIC by directly pouring water onto it.
(2) Do not insert any tool (fine-tipped tool) or finger from an exhaust vent.
(3) Do not put screws, fuses, tools, etc. on the top of OIL MATIC. It is dangerous if they should fall off into a cutout hole in the exhaust vent.
(4) At the exhaust vent, do not place anything that prevents exhaustion of air from it.
(5) During operation, be careful not to put your face, etc. near the exhaust vent as hot air is coming out of it.

● **Precautions for people responsible for maintenance and inspection of customers' machines, or service engineers for manufacturers**

(6) Use a fuse (if the machine has one) of appropriate capacity.
(7) When opening the control box cover for maintenance or inspection, make sure to turn off the power supplied to OIL MATIC.
(8) When removing the main unit cover for maintenance or inspection, make sure to do so after the operation has stopped.
(9) Models equipped with a heater are safe since the heater is usually covered. However, while removing the cover for maintenance or inspection, do not touch the surface of the heater casing with your hands. Also, be careful not to touch the surfaces of compressor and high-voltage refrigerant pipes with your hands as they are hot in some cases.
(10) Should the liquid leak and spatter on the floor around this equipment, watch your step as the floor is slippery.
(11) Should the refrigerant chlorofluorocarbon leak in a refrigeration circuit, ventilate the factory properly to prevent negative effects on human health.

■ Precautions for disposal of equipment

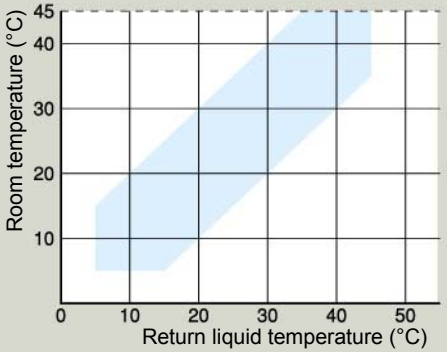
OIL MATIC, which uses chlorofluorocarbon as refrigerant, is designated as the "class-1 specified equipment" set forth in the Fluorocarbons Recovery and Destruction Law. To protect the ozone layer and prevent global warming, the Fluorocarbons Recovery and Destruction Law aims to prevent emission of fluorocarbons used for specified products into atmosphere and requires that fluorocarbons be recovered prior to the disposal of the specified products. While disposing OIL MATIC, please contact the dealer you purchased this product from or request the class-1 fluorocarbon recovery operators registered by a prefecture governor to recover the fluorocarbons.

General precautions

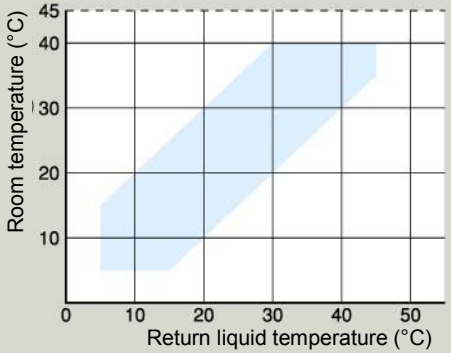
■ About range of use

Since OIL MATIC uses a built-in chiller for cooling the liquid, there are limitations to the range of ambient temperature and oil temperature that can be used. Please use the machine within the range shown in the following diagrams.

● Series C, CL and ML



● Series V, KTV, MRCC and MLCC



* The range of use may vary with models.

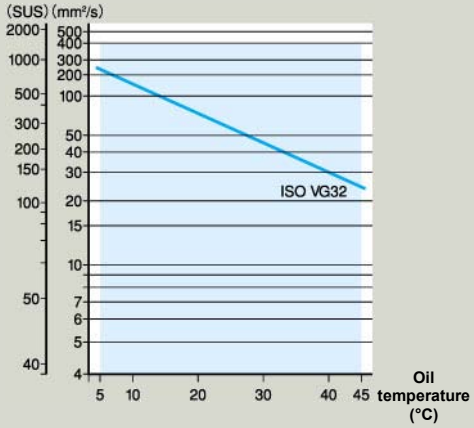
■ About oil to use

There are limitations to types of liquids that can be used for the OIL MATIC depending on the intended use. The following liquids cannot be used, except for some liquids.

- ♦ Cutting oil (fluid), grinding oil (fluid)
- ♦ Water and water-soluble liquid

} Can be used for the series MRCC and MLCC (excluding water) and the series KTV and V (water only).

- ♦ Chemical and food liquids
- ♦ Highly-volatile liquids with poor lubricating properties, such as gasoline and thinner
- ♦ Flame-retardant hydraulic oil
  Phosphoester-series, chlorinated-hydrocarbon series, water+glycol



* For temperature control of special liquid, please consult us so that we will handle it separately with a special model.

■ Transportation method

When transporting or moving the OIL MATIC, do not tilt the machine back and forth or side to side at a 40-degree angle or more. Tilting the machine beyond the limit may cause a compressor failure. Also, do not give strong shock or vibration to the machine. Doing so may cause gas (refrigerant) leakage. Please pay due attention to the above since any of them cannot be fixed in the field.

■ Installation site

Install the OIL MATIC horizontally in a location where it is free from direct sunlight and vibration. The OIL MATIC takes in air from the condenser part (see an appearance diagram). So let an intake vent take in as low-temperature clean air as possible. If there is any equipment that generates heat near the OIL MATIC, then consider the use of partitions, etc. Since hot air is emitted from an exhaust vent (see the appearance diagram) of the OIL MATIC, ensure proper airflow in space in the emitting direction to prevent the hot air from flowing around the machine.

■ Pipe connection

A pump built in the OIL MATIC uses a constant-flow pump (trochoid gear pump) to gain stable heat exchange capability. Because of the relationship between OIL MATIC's internal structure and pump motor's output, use the OIL MATIC at a discharge pressure of 0.35 MPa (0.5 MPa with the drain port fully opened with total relief) or less and intake pressure limit of -0.03 MPa or less. If the discharge pressure is 0.35 MPa or more; then a relief valve is activated, which not only reduces the amount of oil sent and the cooling capacity but also increases the pump noise. If the discharge pressure exceeds -0.03 MPa, then the pump noise increases, the flow rate decreases, and the cooling capacity is reduced. In addition, strong vibration is caused, which leads to OIL MATIC failures. The higher the oil viscosity is under the same piping conditions, or the lower the oil temperature is among the same oil (in general, the oil viscosity increases when the oil temperature is low), the pressure loss resulting from pipe resistance increases. So, when laying out pipes, consider the wintertime low-temperature state. Based on the above, reduce the pipe resistance as much as possible when laying out pipes for OIL MATIC.

■ Power connection

● Power capacity

Determine the power capacity with reference to specification lists and wiring diagrams.
(Be sure to install a Molded Case Circuit Breaker (MCCB) suitable for the capacity at the main power supply.)

● Rotation direction

OIL MATIC needs to be connected to the power supply such that an oil pump and a fan motor in OIL MATIC make positive rotation. Since input terminals of the OIL MATIC power switch are located in order of phases R, S, and T from the left side, connecting the phases R, S, and T of the three-phase power supply to each of the terminals makes the rotation in positive direction. (Since OIL MATIC is equipped with a reverse-phase protection relay, it is not started in case of reverse phase.)

■ Washing and cleaning

Wash the air filter regularly, at least twice a month (warm water, air-washing, etc.), to prevent it from being clogged. (Also, clean the condenser fin unit at least once a year.)

■ About OIL MATIC series V and KTV models

● Reservoir tank sizes

A reservoir tank in which the OIL MATIC series V and KTV machines are installed will have larger plane dimensions than OIL MATIC and the tank depth shall be determined from the right table. Take into consideration that the temperature will be well-controlled if the tank capacity is equal to or larger than three times the flow rate (L/min) of the liquid sent from this tank.

Model	Tank depth
KTV-3, V300	350m/m or more
KTV-5	400m/m or more
KTV-7.5, V750	
KTV-11	
KTV-15, V1500	500m/m or more
KTV-22, V2200	

(Note 1) A too small tank interferes with vortex motion and reduces the cooling capacity.

● Liquid level height

Keep the liquid level to the height that always makes the space between the bottom of a chassis of the OIL MATIC series KTV/V models and the liquid level inside the tank, to be 30-100mm.

(Note 2) If the liquid level becomes lower than the specified level, then there is a possibility that dew is formed on the cooling coil exposed in space and moisture may be mixed into the liquid. The low liquid level makes the cooling coil exposed, which disables cooling of the liquid. For the OIL MATIC machines equipped with a heater, pay particular attention to the liquid level to prevent the heater from operating without water, which is very dangerous.

■ About water-cooled condenser

To use a water-cooled condenser-type OIL MATIC, piping work for passing coolant, which is used to radiate condensation heat, will be needed. The separate table shows coolant pipe diameters and required flow rates.
*In terms of coolant quality, use soft water that causes little adhesion of scales.

Model	Coolant pipe diameter		Coolant inlet temperature	Required flow rate of coolant L/min or more
	Inlet	Outlet		
Model 38	1B	1B	At 25°C	30
			At 34°C	60
Model 22	3/4B	3/4B	At 25°C	19
			At 34°C	42
Model 15, model 11	3/4B	3/4B	At 25°C	13
			At 34°C	30
Model 7.5, model 5	1/2B	1/2B	At 25°C	7.5
			At 34°C	18
Model 3	1/2B	1/2B	At 25°C	6
			At 34°C	12

■ About “OIL MATIC for coolant”

As the coolant for controlling temperature of the “OIL MATIC for coolant,” use clean coolant filtered by a magnet separator, filter, etc. to prevent failures caused by clogging of cooler, circulation pump, etc. from occurring.

Introduction of related products

Controls temperature of mold’s heat medium (oil, water) with high precision
MOLD MATIC AUTOMATIC MOLD TEMP. REGULATOR

Automates and streamlines “transportation” in machine tool / assembly lines
PICK MATIC AUTOMATIC HANDLING SYSTEM

For more info KANTO SEIKI Search

KANTO SEIKI CO., LTD.

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OIL MATIC | Search

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2010.08.1000